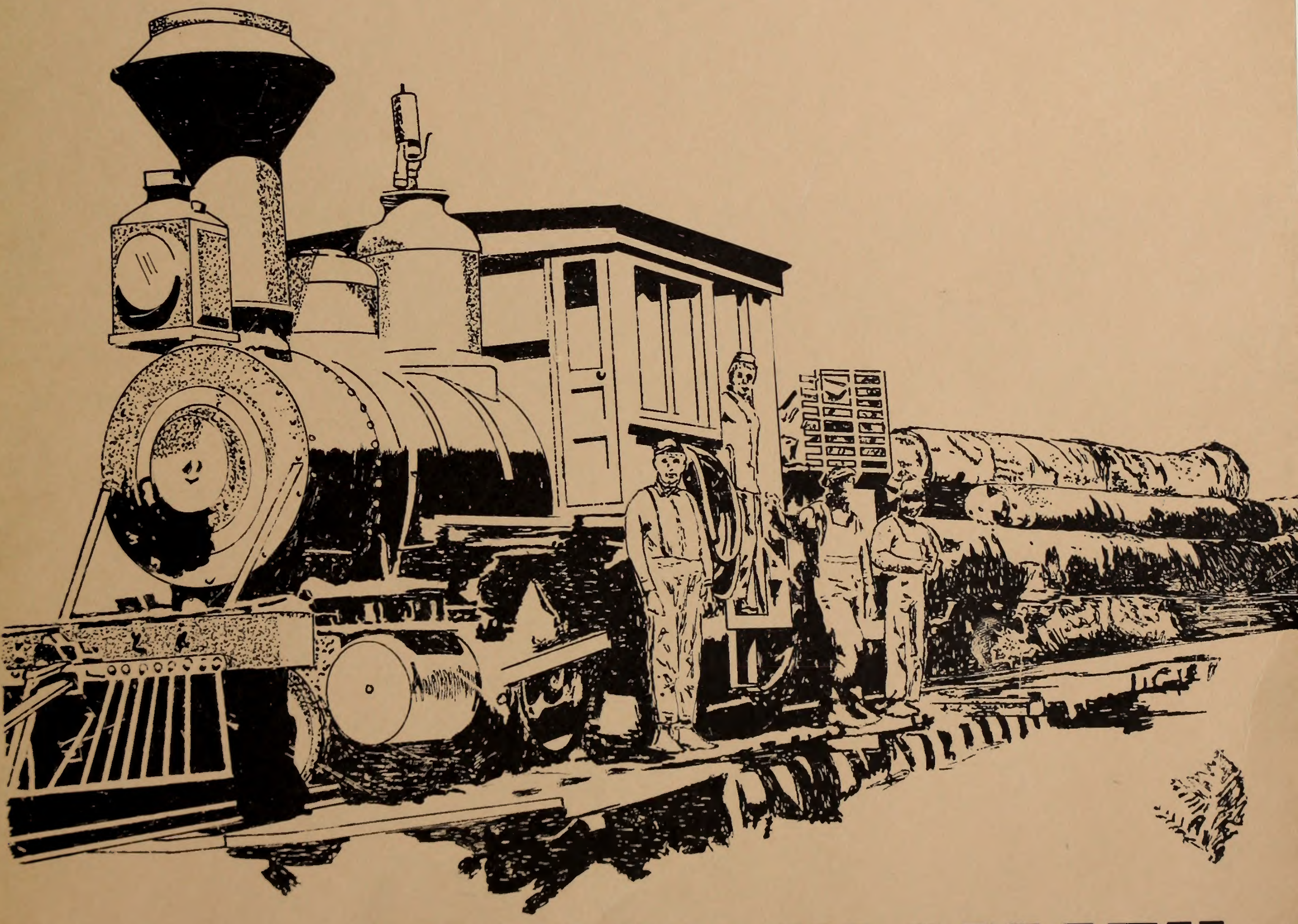
FINAL
TIMBER MANAGEMENT ENVIRONMENTAL STATEMENT



JACKSON-KLAMATH

OREGON STATE OFFICE

DEPARTMENT OF THE INTERIOR

FINAL

ENVIRONMENTAL STATEMENT

JACKSON AND KLAMATH SUSTAINED YIELD UNITS

TEN-YEAR TIMBER MANAGEMENT PLAN

Prepared by

BUREAU OF LAND MANAGEMENT

DEPARTMENT OF THE INTERIOR

Frank Gregg

Director, Bureau of Land Management

SUMMARY

Draft ( ) Final (x) Environmental Statement

Department of the Interior, Bureau of Land Management

1. Type of Action: Administrative (x) Legislative ( )

2. Description of the Action: The Bureau of Land Management proposes a 10-year timber management plan for the 488,258 acres of public land in the Jackson and Klamath Sustained Yield Units of the Medford District (Oregon). Proposed annual timber harvest is 20.55 million cubic feet (120 MM bd. ft.), consisting of 115 MM bd. ft. as sustained yield allowable cut from high intensity forest management land and 5 MM bd. ft. as trial harvest from low intensity forest management land not included in the sustained yield computation base. Treatments specified by the proposal include harvest by two-stage shelterwood, clearcut and single tree selection methods; slash disposal; site preparation; planting of trees; herbicide application; precommercial thinning; fertilization; commercial thinning and road construction.

3. Summary of Environmental Impacts: This proposed action would reduce annual timber harvest from the Jackson and Klamath SYUs by 1.38 million cubic feet (8 MM bd. ft.). Air quality would be adversely affected by particulates from slash burning. Adverse impacts to soil and water resources would be of a lesser magnitude than under the present program, but significant adverse site-specific impacts would still occur within the proposed action. Potential for impacts from application of herbicides and fertilizer on air quality, water resources, aquatic animals and aquatic vegetation is possible, but not probable. Degree of impact on previously unidentified cultural resources is dependent upon success of pre-disturbance cultural resource surveys which are part of the proposal. Analysis shows an insignificant impact on total employment. Although there would be fewer jobs in logging and wood processing, this would be offset by jobs in forest development. Annual revenue distributed to the O&C counties would decline about $0.7 million, based on recent stumpage values.

4. Alternatives Considered:

   (1) No Control of Competing Vegetation.
   (2) Limited Investment in Timber Production.
   (3) Utilization of Surplus Inventory.
   (4) Forestry Program for Oregon.
   (5) No Action.

5. Comments Were Requested From: (see list in Chapter 9.)

6. Date Statement Made Available to EPA and the Public:

   Draft Statement: June 8, 1979
   Final Statement: November, 1979

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CHAPTER I

Description of the Proposed Action

jackson & klamath sustained yield units

1. DESCRIPTION OF THE PROPOSED ACTION

The proposed action is a 10-year timber management plan for public lands administered by the Bureau of Land Management in the Jackson and Klamath Sustained Yield Units (JKSYUs, SYUs), Medford District, Oregon. In the plan, the Bureau of Land Management (BLM) proposes an annual timber harvest of 20.55 million cubic feet (approximately 120 million board feet Scribner Log rule) to be accomplished by two-stage shelterwood, clearcut and single tree selection methods. Also included in the proposal are reforestation, herbicide application, slash disposal, road construction, thinning and fertilization. Table 1-1 summarizes the proposal by acreage and management classes.

A 3-year timber sale plan has been prepared for the JKSYUs by the Medford District and is included in Appendix A. The plan contains preliminary estimates of volume to be harvested, miles of road to be constructed, harvest systems to be employed, acres of slash to be burned, and soil association types to be affected within each sale area. Since many of the timber sale areas (especially fiscal years 1981 and 1982) have not been field checked, the information is subject to change during preparation of final timber sale plans.

A 1-year herbicide plan has also been prepared for the JKSYUs and is outlined in Appendix B. Both plans provide a means to quantify some of the treatment listed in Table 1-1 and facilitate impact analysis in Chapter 3.

This is a proposed harvest level; final decisions with regard to land use allocation, 10-year timber management activities and sustained yield allowable cut in the JKSYUs cannot be made until 30-days after the final environmental statement has been filed with the Environmental Protection Agency (EPA).

The proposed annual harvest is 8 million board feet (MM bd. ft.) less than the present allowable cut level.

1.1 AUTHORITY AND GENERAL POLICY

A landmark law of singular importance to the proposal is the Revested Oregon and California (O&C) Railroad and Reconveyed Coos Bay Wagon Road (CBWR) Grant Lands Act of 1937 (50 Stat. 874; 43 U.S.C 1181a., et seq.). This legislation was the first to specify sustained yield management for Federal lands. Under this act those O&C lands classified as timberlands are managed under sustained yield principles in order to provide a permanent source of timber supply, protect watersheds, regulate stream flow and to provide recreational facilities. Approximately 88 percent of the public land in the JKSYUs is O&C land.

Intermingled public domain lands in the JKSYUs were brought under sustained yield management principles by the Bureau's 1969 application to withdraw these lands from entry under all public land laws except certain disposal acts.

Table 1-1

Summary of Proposal

a) Area by Management Class and Planned Annual Harvest

	Management Class		
	High Intensity Lands	Low Intensity	Limited Mgmt. Lands
Area in Class (acres)	258,597	47,840	44,260
Planned Annual Harvest in millions of cubic feet (million board feet Scribner equivalent)	19.69 (115)	0.86 (5)	none

b) Ten-Year Plan of Prescribed Management Treatments

	Approximate Area in Acres		
Treatment	High Intensity Lands	Low Intensity	Limited Mgmt. Lands
Transportation System			
Construct 375 miles of permanent road	1,600	170	unknown
Reconstruct 100 miles of existing road	0	0	0
Surface 50 miles of existing road	0	0	0
Shelterwood Harvest 1/			
Regeneration Cut	22,300	4,900	0
Final Harvest Cut (includes 10,500 acres of overstory removal)	32,800	0	0
Clearcut	4,000	0	0
Single Tree Selection	900	0	0
Slash Disposal			
Broadcast Burning	23,700	0	0
Gross Yarding (including machine piling)	33,000	0	0
Site Preparation			
Herbicide	16,560	980	0
Mechanical Scarification	22,300	0	0
Planting			
Replant or Interplant (existing non-stocked or understocked clearcuts)	11,200	0	0
Initial Planting (new clearcut or shelterwood regeneration cut areas)	30,400	2,450	0
Replant & Interplant (new cutting areas not adequately stocked by initial planting, includes areas receiving overstory removal)	12,200	1,200	0
Gopher Control	9,000	0	0
Herbicide Release	11,900	250	0
Precommercial Thinning	7,960	0	0
Fertilization	23,185	0	0
Commercial Thinning	15,225	0	0

1/ Approximately 7,400 acres of high intensity lands designated for shelterwood harvest would receive both a regeneration and a final harvest cut within the 10-year period. (Total high intensity lands receiving shelterwood harvest = 55,100 acres - 7,400 acres = 47,700 acres.)

Withdrawal was completed by Public Land Order 5490 (40 FR 7450 [1975]).

In addition, many activities of the BLM are governed by the Federal Land Policy and Management Act of 1976 (90 Stat. 2743, 43 U.S.C. 1701). This law, often referred to as BLM's "Organic Act" or as the FLPMA, established policy for BLM administration of public lands under its jurisdiction. Four provisions of the Act have particular application to this proposal:

-- Broad management authority under the principles of multiple use and sustained yield.

-- Periodic and systematic inventory of the public lands and the resources they contain.

-- Comprehensive land use planning.

-- Protection of scientific, scenic, historical, ecological, environmental, air and atmosphere, water resource and archeological values.

However, in accordance with Section 701(b) of the FLPMA (43 U.S.C. 1701(b)) any such provisions do not apply to the O&C lands if they conflict or are inconsistent with the timber management or revenue disposal provisions of the O&C Act of 1937.

The rate of timber harvest in the JKSYUs is determined under the policy of a decadal allowable cut at a sustained yield level without any planned reduction. Allowable cut planning is undertaken periodically to determine the sustainable level of harvest from lands used for timber production. Normally, this planning takes place every 10 years, but it may occur more often in the event of significant changes in land use, forest condition or technology.

All technically feasible, economically justified and environmentally acceptable intensive forest management practices that are foreseeable in a 20-year planning horizon are used in computing the sustained yield level. Computations recognize intermediate harvests, e.g., thinnings, as an element of the allowable cut. The present and future effect of the adopted practices upon forest productivity is immediately reflected in the determination of annual harvest. This factor, often referred to as allowable cut effect (ACE), allows for immediate recognition of future growth levels which will occur in a managed forest.

BLM has adopted the policy guidelines for timber management contained in the Senate Subcommittee on Public Lands report of 1972 entitled "Clearcutting on Federal Timberlands." The guidelines cover three issue areas. The summary from the Senate report is as follows:

Allowable Harvest Levels

-- Allowable harvest on Federal forest lands should be reviewed and adjusted periodically to assure that the lands on which they are based are available and suitable for timber production under these guidelines.

-- Increases in allowable harvests based on intensified management practices such as reforestation, thinning, tree improvement and the like should be made only upon demonstration that such practices justify increased allowable harvests and there is assurance that such practices are satisfactorily funded for continuation to completion.

-- If planned intensive measures are inadequately funded and thus cannot be accomplished on schedule, allowable harvests should be reduced accordingly.

Harvesting Limitations

Clearcutting should not be used where:

-- Soil, slope or other watershed conditions are fragile and subject to major injury.

-- There is no assurance that the area can be adequately restocked within five years after harvest.

-- Esthetic values outweigh other considerations.

-- The method is preferred only because it will give the greatest dollar return or the greatest unit output.

Clearcutting should be used only where:

-- It is determined to be silviculturally essential to accomplish the relevant forest management objectives.

-- The size of clearcut blocks, patches or strips are kept at the minimum necessary to accomplish silvicultural and other multiple-use forest management objectives.

-- A multidisciplinary review has first been made of the potential environmental, biological, esthetic, engineering and economic impacts on each sale area.

-- Clearcut blocks, patches or strips are, in all cases, shaped and blended as much as possible with the natural terrain.

Timber Sale Contracts

> Federal timber sale contracts should contain requirements to assure that all possible measures are taken to minimize or avoid adverse environmental impacts of timber harvesting even if such measures result in lower net returns to the Treasury.

Vegetation management may be accomplished by mechanical, biological and manual methods; controlled burning or application of herbicides. Herbicides, when employed, are selected to meet a specific problem and used at manufacturer's recommended strength for the specific target species involved at necessary intervals. Alternatives to the use of herbicides are used when judged to be feasible. No chemical is used when there is a basis for belief that water quality will be degraded or that hazards exist which will unnecessarily threaten humans, fish, wildlife, their food chains or other components of the natural environment. Proposed annual herbicide projects are submitted through Bureau and Departmental review process each year prior to approval of any project.

For further discussion of BLM policy in Oregon regarding the use of herbicides refer to BLM's Final Environmental Statement (FES), Vegetation Management with Herbicides: Western Oregon - 1978 through 1987.

1.2 DEVELOPMENT OF THE PROPOSAL

The Jackson and Klamath SYUs constitute the eastern half of BLM's Medford District. The SYUs encompass an area of approximately 1,400,000 acres, of which 488,258 acres are administered by BLM (Table 1-2). Portions of four counties are contained within the SYUs. The west boundary of the area is conterminous with BLM's Josephine Sustained Yield Unit. The north boundary abuts portions of the Umpqua and Rogue River National Forests. The Rogue River and Winema National Forests share a common boundary with portions of the JKSYUs along the east side. The area is bounded on the south by the Oregon-California border and portions of the Klamath and Rogue River National Forests (Figure 1-1, folded map in the back cover pocket).

The determination of which lands within the JKSYUs would be available for timber production and therefore included in the proposal is based on inventories and land use allocations consistant with BLM procedures. Figure 1-2 shows the relationship between the Bureau's land use planning and allowable harvest planning processes.

1.2.1 Timber Production Capability Classification

The Timber Production Capability Classification (TPCC) is an intensive inventory process initiated in 1972 to partition all public land administered by BLM in western Oregon into categories based upon the land's physical

Table 1-2

Land Jurisdiction in Acres1/

SYU	County	Public Lands: O&C2/	Public Lands: PD3/	Public Lands: BLM Total	Other Federal4/	State	County	Private	Total
Jackson									
	Douglas	593	0	593	0	0	0	0	593
	Jackson	341,869	46,923	388,792	8,180	4,330	7,167	727,506	1,135,975
	Josephine	4,275	381	4,656	0	80	1,751	2,935	9,422
SYU Total		346,737	47,304	394,041	8,180	4,410	8,918	730,441	1,145,990
Klamath									
	Jackson	39,011	4,595	43,606	0	0	0	54,445	88,051
	Klamath	46,332	4,279	50,611	2,993	0	0	100,397	154,001
SYU Total		85,343	8,874	94,217	2,993	0	0	154,842	252,052
Planning Area Totals		432,080	56,178	488,258	11,173	4,410	8,918	885,283	1,398,042

1/ Acreage figures for public lands are derived from BLM master title plats. Other acreage figures are BLM estimates.

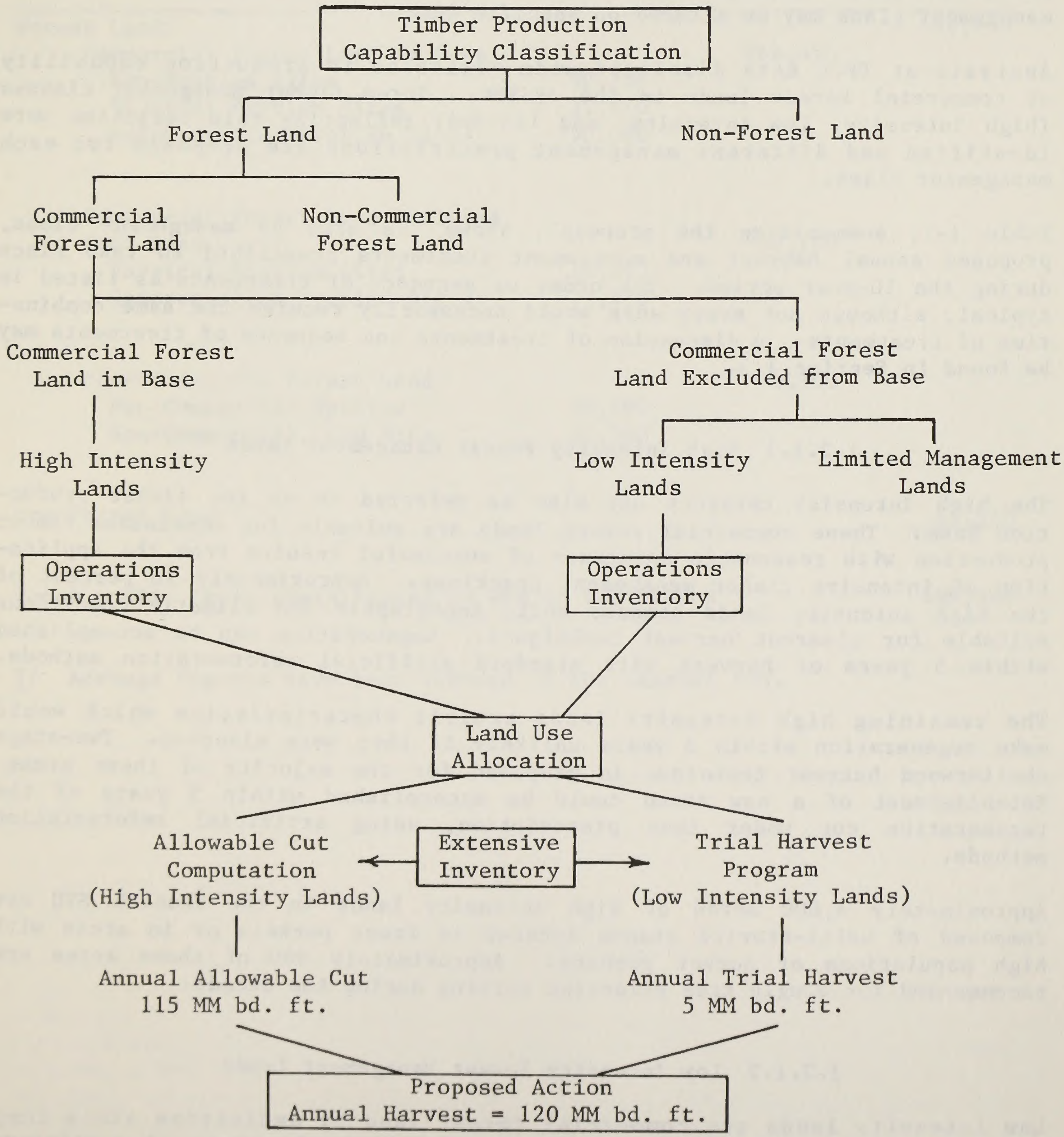
2/ Revested Oregon & California Railroad Grant Lands

3/ Public Domain Lands

4/ Includes U.S.Forest Service, Corps of Engineers, and Bureau of Reclamation

Figure 1-2

Relationship of Land Use Planning to Allowable Harvest Planning



and biological capacity to produce timber. Criteria used to define TPCC classes are shown in Appendix C. Table 1-3 shows the results of TPCC in the JKSYUs.

The purpose of TPCC is to identify commercial forest land which could be managed on a sustained yield basis. This land would form the timber production base for computation of the annual allowable harvest. As new data become available from intensive on-site analysis, management direction for future management plans may be altered on specific tracts.

Analysis of TPCC data disclosed wide variation in production capability of commercial forest lands in the JKSYUs. Three timber management classes (high intensity, low intensity and limited) reflecting this variation were identified and different management prescriptions are proposed for each management class.

Table 1-1, summarizing the proposal, shows the area by management class, proposed annual harvest and management treatments prescribed to take place during the 10-year period. The order or sequence of treatments as listed is typical, although not every acre would necessarily receive the same combination of treatments. A discussion of treatments and sequence of treatments may be found in Section 1.3.

1.2.1.1 High Intensity Forest Management Lands

The high intensity category may also be referred to as the timber production base. These commercial forest lands are suitable for continuous timber production with reasonable assurance of successful results from the application of intensive timber management practices. Approximately 16 percent of the high intensity lands possess soil, topographic and climatic conditions suitable for clearcut harvest techniques. Regeneration can be accomplished within 5 years of harvest with standard artificial reforestation methods.

The remaining high intensity lands exhibit characteristics which would make regeneration within 5 years unlikely if they were clearcut. Two-stage shelterwood harvest technique is proposed for the majority of these areas. Establishment of a new stand could be accomplished within 5 years of the regeneration cut under this prescription, using artificial reforestation methods.

Approximately 4,000 acres of high intensity lands in the Klamath SYU are composed of multi-storied stands located in frost pockets or in areas with high populations of pocket gophers. Approximately 900 of these acres are recommended for single tree selection cutting during the decade.

1.2.1.2 Low Intensity Forest Management Lands

Low intensity lands are commercial forest land by definition since they are capable of growing in excess of 20 cubic feet of commercial coniferous

Table 1-3

Timber Production Capability Classification - 1972

Category		Acres 1/
Forest Land		440,650
Commercial Forest Land in Base		262,450
Non-Problem Sites	90,750	
Physical Problem Sites	21,620	
Reforestation Problem Sites	150,080	
Commercial Forest Land Excluded from Base		92,100
Physical Problem Sites	14,620	
Reforestation Problem Sites	77,480	
Non-Commercial Forest Land		86,100
Non-Commercial Species	58,600	
Non-Commercial, Low Site	27,500	
Non-Forest Land		47,610
Total public lands administered by BLM in the JKSYUs		488,260

1/ Acreage figures have been rounded to the nearest ten.

species per acre per year. They are not included in the timber production base for allowable cut determination because the regeneration period is expected to be in excess of 5 years after clearcutting or after the regeneration cut of a shelterwood regime.

A one decade trial harvest program from low intensity lands is proposed to determine what practices, if any, might be effective to facilitate regeneration within the prescribed 5 year period, and to gather empirical data on the actual regeneration period.

1.2.1.3 Limited Forest Management Lands

Approximately 44,260 acres of commercial forest land have only limited forest management potential. These lands are characterized by shallow rocky soils, extremely droughty conditions resulting in severe regeneration problems, highly erodible soils, high water tables and/or very steep slopes. Regeneration time, if these lands were logged, would be considerably in excess of 5 years, and successful reforestation would be uncertain.

No planned annual harvest is proposed from these lands because of probable site degradation. Harvesting would be restricted to mortality-salvage or road right-of-way timber if it should become necessary to construct roads through any limited management land. No volume figure is projected or included in the proposal.

1.2.2 Operations Inventory

For BLM to carry out the timber management program effectively, specific information as to the location and current condition of the various forest types within the land base must be available to the managers. This is accomplished through the Operations Inventory (OI).

The OI is an intensive inventory providing forest type maps which show the location and identification number of each homogeneous forest type island. Corresponding cards list acreage, silvicultural needs and opportunities for forest management practices such as overstory removal or thinning. Operations Inventory thus provides a basis for establishing priorities for treatment based on stand conditions and productivity.

1.2.3 1977 Reinventory

A reinventory of commercial forest land in the JKSYUs was completed in 1977 employing procedures for extensive inventory jointly developed by the USFS and BLM (USDA, FS 1976). The reinventory uses the same basic inventory design as was used for determination of the present allowable cut, but with further refinement to include stratification of commercial forest land based on information obtained from the OI and TPCC. Statistical analysis

indicates the sample mean volume per acre in the JKSYUs is within 7 percent of the true mean volume per acre at one standard deviation.

The reinventory indicates a forest distribution as displayed in Table 1-4. Age classes range from non-stocked, where reproduction has not been established, to 400 years.

The age class distribution of the present forest is greatly out of balance when compared to that of a regulated forest. Whereas a regulated forest would have approximately equal areas for each age class, the present forest is as shown in Figure 1-3.

1.2.4 Other Resource Inventories

Other inventories were conducted to identify and categorize specific resource capability and potential. A detailed soil survey for the entire Medford District was completed in December 1975. Recreation planners applied portions of the BLM's Recreation Information System, an inventory approach for determining inherent potential of the land to support various recreation activities. Visual resource specialists inventoried and classified the JKSYUs for visual and esthetic considerations. A review and compilation of known cultural resource data (Class I cultural resource inventory) has been completed for the JKSYUs. Wildlife biologists inventoried deer and elk winter range and spotted owl nest sites. Fisheries biologists conducted surveys of Class I and Class II streams. Botanical surveys for endangered, threatened and rare plants were completed for the Medford District in August 1978.

1.2.5 Land Use Allocation

The final step in determination of lands included in the proposal involved application of the Bureau planning system. After identifying resources and opportunities based on inventory data, BLM resource specialists make realistic recommendations to maximize their particular resource. Recommendations inevitably conflict on occasion. The identification and--where feasible --resolution of these conflicts is the heart of the BLM land use allocation process. All potential conflicts and possible ways to resolve these conflicts are analyzed. Those alternatives that best resolve conflicts while maintaining maximum possible quality and quantity of all resource values involved are selected.

The Medford District utilized this capability during the conflict analysis stage of the Management Framework Plan (MFP) process. Numerous alternative solutions to individual conflicts were considered prior to formulating the proposed action which was circulated for public review and comment in September 1978. Final decisions cannot be made until 30 days after a final environmental statement is filed with the Environmental Protection Agency.

Table 1-4

Age Class and Volume
High Intensity Lands, 1978

Age Class	Acres	Total Volume M. Cu. Ft.	Age Class	Acres	Total Volume M. Cu. Ft.
non-stocked	3,918	-	140	10,084	39,988
1-5	1,962	-	150	12,570	53,369
10	4,918	-	160	13,003	54,876
20	13,120	-	170	3,731	16,612
30	2,503	5,098	180	7,163	32,448
40	3,688	8,372	190	2,807	13,016
50	2,999	7,474	200	10,489	49,756
60	9,542	25,709	210	3,850	18,109
70	7,883	22,636	230	520	2,769
80	16,822	52,016	240	415	2,037
90	9,737	31,695	250	9,703	49,013
100	10,413	35,427	300	67,178	356,547
110	12,499	44,823	350	566	2,980
120	12,213	45,385	400	5,537	26,950
130	15,142	58,601			
			Total	274,975 1/	1,055,705

1/ The difference in total acres as compared to commercial forest land base acres shown in Table 1-3 is due to double counting of those acres exhibiting two-storied characteristics.

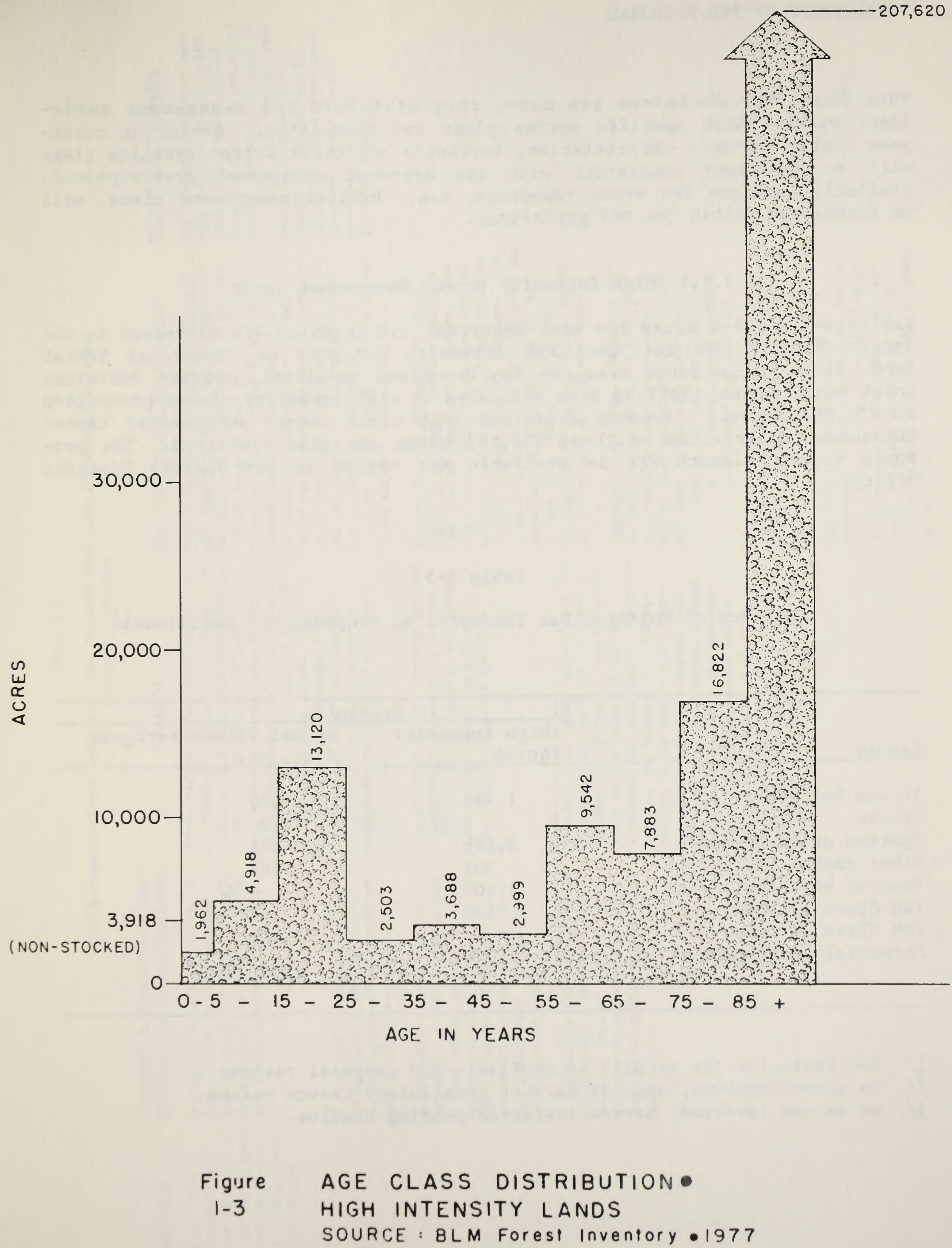


Figure 1-3 AGE CLASS DISTRIBUTION • HIGH INTENSITY LANDS

SOURCE : BLM Forest Inventory • 1977

When final MFP decisions are made, they will form the management guidelines within which specific action plans are formulated. Annual or multi-year timber harvest, reforestation, herbicide and other forest practice plans will be developed consistent with the approved management prescriptions. Similarly, actions for other resources, e.g., habitat management plans, will be formulated within the MFP guidelines.

1.2.5.1 High Intensity Forest Management Lands

Tables 1-5 and 1-6 array the most important issues which are addressed in the Jackson-Klamath MFP for the high intensity category of commercial forest land. These tables show resource conflicts and resultant proposed decisions which would reduce the land area allocated to high intensity timber production to 258,597 acres. Proposed decisions that could impose substantial timber management constraints on these 258,597 acres are also displayed. The proposed Jackson-Klamath MFP is available for review in the Medford District Office.

Table 1-5

Summary of Multiple Use Tradeoffs in Proposed MFP Decisions1/

Issues	Tradeoffs	
	High Intensity Acres	Annual Volume Foregone M bd. ft.
Stream buffers	1,285	673
Grouse	- 2/	20
Spotted owl management	2,176	875
Other raptor protection	352	287
Special botanical areas	1,400	- 3/
VRM Class I lands	130	97
VRM Class II lands	- 2/	1,222
Potential recreation sites	2,200	- 3/
Totals	7,543	3,174

1/ See Table 1-6 for details of conflicts and proposal rationale.
2/ No acres involved, special harvest constraints reduce volume.
3/ No volume involved, harvest deferred pending studies.

Table 1-6

MFP Recommendations, Conflicts, and Proposed Decisions Affecting the Timber Management Program

Multiple Use Issue	Resource Recommendations that Conflict with Timber Management	Conflicts	Proposed Decision and Rationale	Significant Tradeoffs
I. Stream Buffers: The effects of streamside timber harvest and the application of fertilizer and herbicides on fishery, wildlife, watershed, and recreation values.	A fishery recommendation is to leave a 200 ft. undisturbed buffer on each side of Class I streams and a 50 ft. buffer on all Class II streams.	Unrestricted timber harvest and use of chemicals adjacent to Class I or Class II streams could threaten the stability of cold-water game fish populations. Total loss of the fish populations in these streams would result in a loss of $299,000 in local personal income annually and 20 fishery-dependent jobs.	Timber Harvest Adjacent to Class I and Important Class II Streams: Provide an average 100 ft. riparian buffer zone on each side of Class I and important Class II streams. Stream buffer widths may be greater or less than those proposed and would vary according to the terrain. No harvest would be permitted in the buffer except to benefit wildlife (e.g., remove windthrown trees blocking streams) or to salvage dead trees after a devastating fire.	The timber production base would be reduced by 1,285 acres which would result in a reduction of potential annual allowable harvest of 673 M bd. ft. The economic benefits forgone would amount to approximately eight full-time equivalent jobs and direct local personal income of $110,000 annually.
	A wildlife recommendation is to maintain a 200 ft. undisturbed buffer along perennial and intermittent streams.	Unrestricted timber harvest in riparian zones could result in a serious depletion of wildlife populations.		
	A watershed recommendation calls for a 100-200 ft. undisturbed buffer on each side of major perennial streams, a 20-50 ft. buffer along minor perennial streams and a 10-30 ft. buffer next to important intermittent streams.	Unrestricted timber harvest and use of chemicals adjacent to stream channels could increase streambank erosion and result in serious degradation of water quality.	Timber Harvest Adjacent to Other Class II Streams: Do not restrict the type of harvesting system, provided shade from hardwoods, noncommercial conifers, and brush is maintained adjacent to the streams. Use logging systems that will provide the least amount of damage to the area. Do not fall timber into or yard through the streams. Do not harvest an entire drainage at one time.	
	A recreation recommendation is to maintain a 200 ft. buffer on each side of Class I streams within which no major vegetative modifications would take place.	Unrestricted timber harvest and use of herbicides adjacent to Class I streams would destroy the esthetic value of the affected stream stretches for many years. Maintenance of the recommended 200 ft. buffers would remove 2,570 acres from the timber production base, reducing potential annual harvest by 1,346 M bd. ft. The economic benefits foregone would amount to approximately 16 full-time equivalent jobs and direct local personal income of $220,000 annually.	Chemical Herbicides: Maintain the following minimum width (measured horizontally) unsprayed buffer strips when applying any herbicide adjacent to perennial streams: 100 ft.-aerial applications 25 ft.-vehicle applications 10 ft.-hand applications Fertilizers: Do not fertilize within 100 ft. of any perennial stream. Rationale: Buffer strips as proposed provide reasonable protection to other resources while maintaining emphasis on timber management. Minimum adverse economic effect is attained with the proposed allocation.	

Table 1-6

MFP Recommendations, Conflicts, and Proposed Decisions Affecting the Timber Management Program

Multiple Use Issue	Resource Recommendations that Conflict with Timber Management	Conflicts	Proposed Decision and Rationale	Significant Tradeoffs
II. Grouse: The effects of timber harvest on populations of blue and ruffed grouse.	A wildlife recommendation is to maintain some groups of vigorous, large (over 25 inches dbh) true fir and Douglas-fir trees along major ridges, to protect the grouse's winter habitat. The loss of the grouse populations would cost approximately $9,000 a annually in local personal income dependent on grouse hunting expenditures.	Unrestricted timber harvest of all large Douglas-fir and true fir along major ridges would destroy habitat essential for maintaining viable populations of grouse.	Maintain groups of vigorous (over 25" dbh) true fir and Douglas-fir along major ridges by management under a protective shelterwood harvest system. Grouse winter range of the quality which meets cover and food requirements is found on a very small part of the SYUs. Reducing the annual timber harvest by 20 M bd.ft. is a small price for the maintenance of the grouse populations.	The timber production base would not be reduced, but a 20 M bd.ft. reduction in potential annual allowable harvest would occur.
III. Spotted Owls: The effects of timber harvest on spotted owl habitat.	A wildlife recommendation is to manage for eight pairs of northern spotted owls in accordance with management guidelines set forth in BLM Oregon State Office Instruction Memo 78-74. These guidelines require buffers of approximately 1,200 acres per pair, of which 300 acres should consist of old-growth forest. In addition, other northern spotted owl nests found within proposed sale areas will be protected by buffers during the period of March 1 to July 1.	Unrestricted timber harvest in old growth Douglas-fir would destroy habitat of these old-growth dependent species. Reserving these old growth stands from the timber production base would remove 2,176 acres of high intensity timber management lands from the timber production base.	Adopt the wildlife recommendation. The BLM is a party to a management agreement with USFS, USFWS and ODFW. The removal of 2,176 acres from the timber production base coupled with adjacent lands will meet BLM's obligation for management of this species in the JKSYUs with only modest economic losses.	Reduces the potential annual allowable harvest by 875 M bd.ft. resulting in forgone economic benefits amounting to approximately six full-time equivalent jobs and $94,000 of annual direct local personal income.
IV. Protection of Other Raptors: The effects of timber harvest on raptors other than spotted owls.	Wildlife recommendations are: to avoid disturbing the cliffs identified as peregrine falcon habitat in the Klamath River Canyon or adjacent downslope areas within a half-mile; to maintain a 30-acre undisturbed buffer around identified goshawk nests, a 10-chain buffer around osprey nests, and a 2-5 chain buffer around known nesting sites of other raptor species identified in the SYUs.	Unrestricted harvest of timber in these buffers would result in declines of the limited populations of peregrine falcons (which are protected under the Endangered Species Act), goshawks, ospreys, and red-tailed hawks. The wildlife recommendations would exclude from the timber production base a total of 352 acres of high intensity timber management lands and reduce potential annual harvest by 287 M bd.ft.	Accept the wildlife recommendations. Protection of the endangered peregrine falcon is required by law. The economic cost of protecting the limited populations of the other species is small.	The 287 M bd.ft. reduction in potential annual harvest would result in forgone economic benefits that are equivalent to about two full-time jobs and $31,000 of annual direct local personal income.

Table 1-6

MFP Recommendations, Conflicts, and Proposed Decisions Affecting the Timber Management Program

Multiple Use Issue	Resource Recommendations that Conflict with Timber Management	Conflicts	Proposed Decision and Rationale	Significant Tradeoffs
V. Sites Having Possible Special Botanical Values: The effects of timber harvest on sites identified as having such values.	A recommendation is to exclude harvest activities in 11 areas tentatively identified as having special ecological values until the presence or absence of such special values can be ascertained.	Unrestricted timber harvest on those lands possibly possessing unique botanical values could destroy these values. Exclusion of the 1,400 acres of high intensity timber management lands involved from the timber production base would reduce the potential annual harvest by 671 M bd.ft. The economic benefits foregone would be equivalent to approximately eight full-time jobs and direct local personal income of $108,000 annually.	Delay forest management and other activities until ecological value are ascertained, but do not withdraw the lands from the timber production base. Excluding harvest from these lands until their ecological values can be ascertained will protect those areas having unique qualities.	None.
VI. Management of VRM Class I Lands: The effects of timber harvest on those lands proposed for inclusion in VRM Class I.	VRM and associated recommendations are to manage the proposed VRM Class I lands primarily for natural ecological change. Three areas are in this category: the Lost Lake and Surveyor nominated research natural areas and the Keene Creek area proposed to be managed for ecological baseline monitoring.	Unrestricted timber harvest on these lands would destroy their natural values as well as their value as baseline monitoring areas to evaluate the effects of forest management activities and other resource programs on wildlife associations, plant communities and ecological changes. Exclusion of these areas from the timber production base would affect a total of 130 acres of high intensity timber management lands.	Adopt the VRM and associated recommendations. These lands have been receiving special management for the protection, maintenance, and study of specific unique ecological and environmental values. The economic cost of preservation of these lands is warranted to preserve and maintain these values.	Potential allowable harvest would be reduced by 97 M bd.ft. at an opportunity cost equivalent to about one full-time job and $10,000 in direct annual local personal income.
VII. Management of VRM Class II Lands: Pertains to implementation of Visual Resource Management Class II objectives.	A VRM recommendation for Class II lands is that vegetation manipulation projects be designed to repeat features of a natural landscape so as to not be obvious to the casual observer. A protective shelterwood harvest program would achieve this objective in the visual foreground.	Unrestricted timber harvest on lands classified as VRM II would reduce their esthetic value. Limiting timber harvest on these lands in accordance with the VRM recommendation would reduce the potential annual harvest by 1,222 M bd.ft.	Accept the VRM recommendation. The visual foreground would be protected by use of a protective shelterwood harvest technique at a minimum cost to timber production capability. With careful planning, timber sales can be laid out and harvested in Class II visual background without creating a visual intrusion.	The timber production base would not be reduced, but a 1,222 M bd,ft reduction in potential annual harvest would occur. Annual economic benefits foregone would be equivalent to about eight full-time jobs and $131,000 of direct local personal income.

Table 1-6

MFP Recommendations, Conflicts, and Proposed Decisions Affecting the Timber Management Program

Multiple Use Issue	Resource Recommendations that Conflict with Timber Management	Conflicts	Proposed Decision and Rationale	Significant Tradeoffs
VIII. Potential Recreation Sites: The effects of timber management activities on sites having the potential for recreation development.	A recreation recommendation is to delay harvest activities on 35 potential recreation sites until their suitability for recreational development can be reevaluated.	Unrestricted timber harvest in inventoried potential campgrounds and/or picnic sites would destroy their recreational development potential. Exclusion of the 2,200 acres of high intensity timber management lands involved from the timber production base would reduce the potential annual harvest by 1,617 M bd.ft. The annual economic benefits foregone would be equivalent to an estimated 19 full-time jobs and $258,000 of direct local personal income.	Delay harvesting on the inventoried potential recreation sites until after a determination is made concerning their suitability for recreation development, but do not withdraw the lands from the timber production base. The proposed decision to delay harvest on 2,200 acres of potential recreation sites will preserve the quality of these areas until a review can be made. After the study has been completed the timber production land base can be adjusted to exclude those lands found to be appropriate for eventual recreation site development.	None.
IX. Deer and Elk: The effects of timber harvest on deer and elk.	A wildlife recommendation is that management of critical deer winter ranges be directed to provide an average of 384 acres of foraging area and 256 acres of cover per square mile to provide adequate cover and forage areas in close proximity. Another wildlife recommendation is that on deer and elk, summer, spring, and fall ranges uneven-aged timber management should be employed on 250 acres per square mile, to provide habitat diversity.	Of the 88,000 acres of critical deer winter range in the SYUs, some 18,900 acres are high intensity timber management lands. Most of the balance of the SYUs are summer, spring, and fall ranges.	In critical winter range, harvest in an orderly pattern and minimize the effects of cover removal. In other ranges, employ uneven-aged stand management only where prescribed for other purposes. A large portion of the critical winter range will remain undisturbed by timber management activities, so normal timber management will seldom lead to adverse impact on the foraging area/cover area relationship. On the summer, spring, and fall range habitat diversity is provided by lands not subject to timber management. The small incremental advantage for big game from a more restrictive timber harvest program would not justify the economic losses.	None.
X. Old Growth Habitat: The effects of timber management on the habitat of wildlife species dependent on old-growth forest ecosystems.	A wildlife recommendation is that one 320-acre tract of commercial timber for every five sections be managed on a 250-300 year rotation, to provide a continuing reservoir of old-growth habitat.	If the areas selected were high intensity timber management lands, a significant reduction in annual timber harvest, and dependent jobs and income would result from adoption of the wildlife recommendation.	Do not extend the harvest age for any stands of high intensity timber management lands for the purpose of providing or maintaining old growth habitat. There is adequate acreage of forested land in the SYUs -- some 94,000 acres -- not allocated to planned harvest, to provide substantially more than the acreage requested in the wildlife recommendations.	None.

1.2.5.2 Low Intensity Forest Management Lands

Resource conflicts for the 47,840 acres of low intensity lands were essentially of the same types as those displayed in Tables 1-5 and 1-6 for high intensity lands. Inasmuch as harvest from low intensity lands is a trial program for one decade only, designed to generate specific information, harvest would not take place where resource conflict situations are identified. Adequate non-conflict areas are available to allow this program to proceed as planned during the decade.

1.2.5.3 Limited Forest Management Lands

Lands in this category are excluded from high or low intensity management because of severe regeneration problems or fragile soils. The proposed decision is for no planned harvest from the 44,260 acres of limited management lands.

Areas of conflict are similar to those of high and low intensity lands. Incidental harvest, should such be necessary, will be strictly governed by environmental assessments specific to the situation.

1.2.5.4 Minor Forest Products

Sales of minor forest products--posts, poles and particularly firewood --have been an incidental aspect of the timber management program. The demand for firewood, especially by private parties for personal use, has been increasing annually. Some of the demand is met with slash or debris from timber sales.

Management of non-commercial forest land, primarily hardwoods, for firewood production was considered. Harvesting of firewood traditionally occurs above road cutbanks and within 200 feet of the road.

The proposed decision is to manage hardwood stands for firewood on noncommercial sites with existing road access, except that no cutting would be conducted in streamside buffers and oaks would be managed primarily for wildlife. Commercial firewood sales would be made as demand developed.

1.2.6 Allowable Cut Determination

The sustained yield allowable cut is determined in accordance with the objectives of the proposal and is based on the land use allocation arrived at through the Bureau planning system. Allowable cut in the proposal would be the annual harvest from high intensity lands. Volume attained through trial harvest on low intensity land, while planned and proposed for the first decade, is not predictable into the future and therefore would not be part of the proposal beyond the first decade.

Within a 20-year planning horizon, the objective is to maximize sustainable yield of timber suitable for the production of lumber and plywood. For accuracy, allowable cut is computed and projected into the future on the basis of cubic feet. Since board feet Scribner is expected to remain the industry standard for the coming decade, the decadal allowable cut is converted to Scribner board foot equivalents, based on the age and size of timber expected to be included in sales during the decade.

1.2.6.1 Management Assumptions

A wide range of possible management practices was considered. The practices used in the forest simulation model (described in Section 1.2.6.2) for high intensity lands are varied harvest, reforestation and growth stimulation techniques.

Prescribed harvest methods are a combination of the clearcut, two-stage shelterwood and single tree selection systems, dependent on site suitability. Intensive planting is planned following the regeneration cut of a shelterwood regime or clearcutting. Minimum planned final harvest age would be 60 years. Approximately 1,600 acres would be converted to non-forest during the first decade due to completion of the permanent road system.

It is expected to require an average of 4 years from the sale date of a clearcut or regeneration cut timber sale to establish a new stand of coniferous seedlings. The assumed regeneration period is predicated on successful plantation establishment within 1 year following a regeneration cut of the two-stage shelterwood system or clearcutting. Maximum time for removal of timber under a timber sale contract is 36 months, although the average time is less. Slash disposal and control of competing vegetation may be required prior to planting. The 4-year regeneration period is thus an estimate for use in the forest simulation model which is used to calculate the sustainable allowable cut level.

Use of genetically superior planting stock is not considered operationally feasible for the JKSYUs since sufficient supplies will not be available within the 20-year planning horizon. Genetic tree improvement is an ongoing BLM program for southwestern Oregon. When adequate supplies of genetically superior stock can be assumed the effect would be considered in allowable cut computation for the Jackson, Klamath and Josephine SYUs.

Use of herbicides for control of vegetative competition to favor growth of commercial coniferous species is proposed as part of timber stand reestablishment. Herbicides would be used for site preparation before planting on approximately 16,560 acres of high intensity lands during the first decade. Approximately 11,900 acres of established reproduction would be released from brush or grass competition by herbicide treatment during the same period.

Intensive management practices enhance growth and productivity once a stand of commercial coniferous species is established. Three intensive management practices are considered suitable (for the JKSYUs) following harvest and regeneration. Precommercial thinning, commercial thinning and fertilization are economically justified and result in net volume increases.

Thinning at a 20-year interval is assumed, with precommercial thinning no earlier than age 13. Fertilization is planned and assumed in the simulation model immediately after precommercial thinning and every 10 years thereafter. Commercial thinning would be employed when stands reach commercial size--no sooner than age class 30.

Each addition of an assumed practice increases the maximum potential harvest level in the computation of sustainable annual harvest. Table 1-7 shows the magnitude of potential harvest increase attributable to proposed treatments.

Table 1-7

Effect of Assumed Practices on Annual Harvest Volume,
High Intensity Lands

Sustainable Annual Harvest

	Jackson SYU		Klamath SYU		Total	
Assumed Practice	(MM Cu.Ft.)	(MM Bd.Ft.)	(MM Cu.Ft.)	(MM Bd.Ft.)	(MM Cu.Ft.)	(MM Bd.Ft.)
Harvest and Plant	8.83	52.05	3.82	22.64	12.65	74.69
Gopher Control	+ .70	+ 4.12	+ .28	+ 1.58	+ .98	+ 5.70
	9.53	56.17	4.10	24.22	13.63	80.39
Vegetation Management	+ 3.06	+17.94	+1.12	+ 6.67	+ 4.18	+ 24.61
	12.59	74.11	5.22	30.89	17.81	105.00
Precommercial and Commercial Thinning	+ 1.03	+ 5.65	+ .31	+ 1.14	+ 1.34	+ 6.79
	13.62	79.76	5.53	32.03	19.15	111.79
Fertilization	+ .38	+ 2.24	+ .16	+ .97	+ .54	+ 3.21
Total Potential	14.00	82.00	5.69	33.00	19.69	115.00

1.2.6.2 Mechanics of Computation

High Intensity Lands

The annual proposed allowable cut of 19.69 million cubic feet (115 MM bd. ft.) for the 258,597 acres of high intensity lands proposed for timber production was calculated with a computerized forest simulation model (SIMIX). The SIMIX Model is also used to determine the harvest level for each of the land use alternatives.

The SIMIX model has three cutting method options:

- clearcut only
- three-stage shelterwood cut only
- combination clearcut and three-stage shelterwood cut

Since the prescribed cutting methods for the lands in the Jackson and Klamath Sustained Yield Units are predominately clearcutting and two-stage shelterwood cutting, followed in each case by intensive planting, the net effects on stand establishment, yields and volumes per acre are very similar. Therefore, the clearcut option of the SIMIX program was utilized.

The model projects the present forest 400 years into the future. Based on the management assumptions previously described and using local yield tables derived from tree form data gathered in the JKSYUs, the model determines the largest allowable cut sustainable over the 40 decade projection period. Age class distribution of forest stands, annual wood growth, wood volume and acreage of certain treatments are also determined for each of the 40 decades.

A 400-year projection is necessary to assure that the base non-declining harvest level is at the highest level that can be sustained indefinitely. This projection permits a comparison of alternative harvest levels to the base non-declining level. The projection is not to be considered as a 400-year timber management plan.

As indicated in Figure 1-4, the most critical elements that influence the magnitude of the harvest level cut are total wood volume and annual wood growth, present and future. In the JKSYUs the proposed allowable cut is approximately four times the present current annual growth. This difference is primarily due to the preponderance of overmature stands in the JKSYUs, which are growing at low rates (or not at all) as a result of high natural wood loss caused by insects, disease, and tree mortality.

As older stands are harvested and replaced with vigorous young-growth stands, two things would occur: The total wood volume would be reduced as existing overmature timber was removed, but total annual growth would increase over time. By the year 2038, growth would exceed the allowable cut, indicating that the cut theoretically could then be increased if all other things were to remain constant. It is approximately at this time that a forest comprised of an equal distribution of age class acreages, ranging from recently established stands through stands 70 years old, would be attained. From then on, total

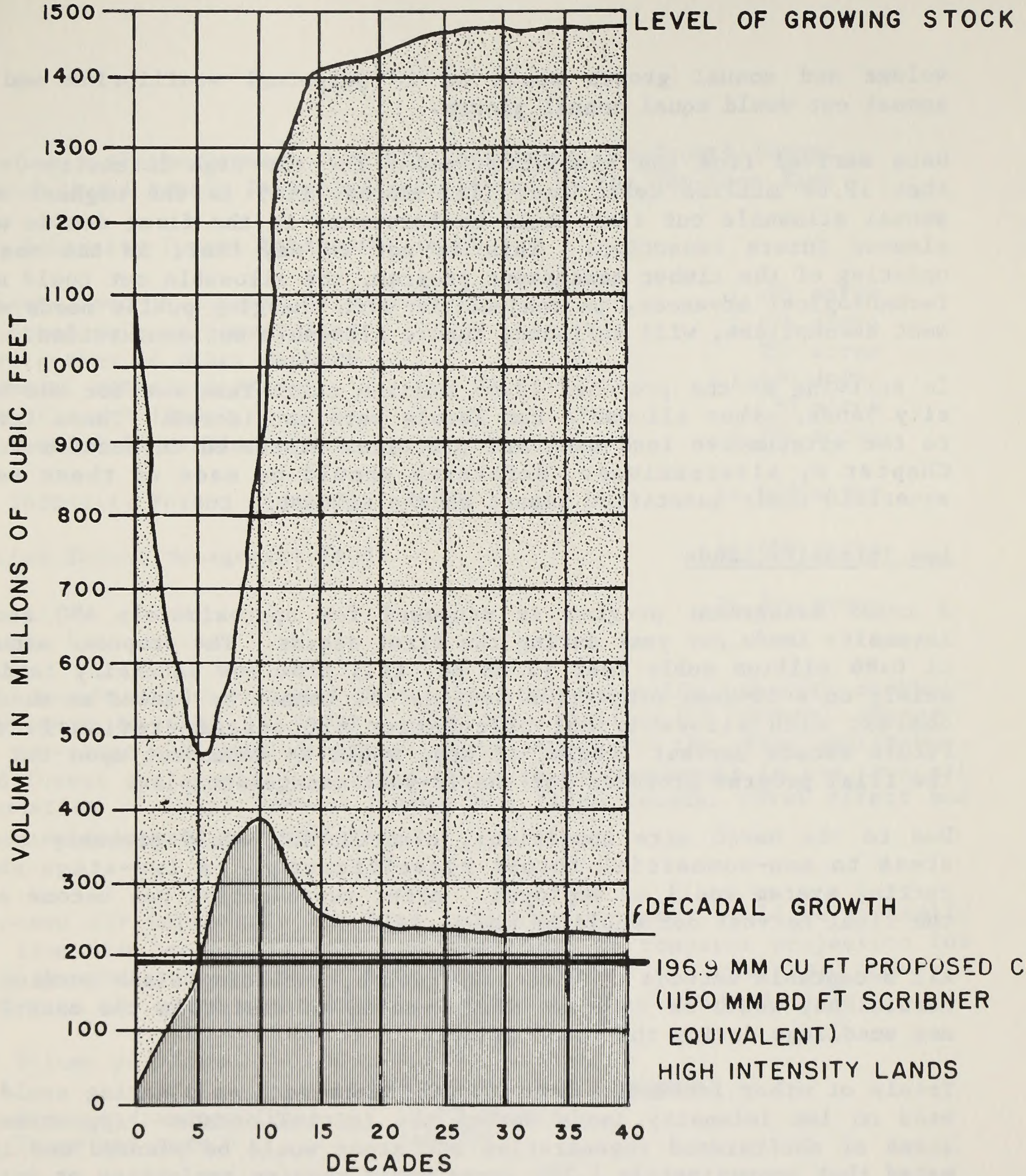


Figure 1-4 PROJECTED GROWTH, TOTAL VOLUME & PROPOSED ALLOWABLE CUT BY DECADE
SOURCE: BLM Inventory 1977

volume and annual growth would be in perpetual equilibrium and therefore annual cut would equal annual growth.

Data derived from the simulation model for the high intensity lands assure that 19.69 million cubic feet (115 MM bd. ft.) is the highest sustainable annual allowable cut that could be harvested in the first decade without any planned future reduction. This is not to say that, in the next periodic updating of the timber management program, the allowable cut could not change. Technological advances, in conjunction with changing public needs and management assumptions, will influence future allowable cut computation.

In arriving at the proposed 19.69 million cubic feet cut for the high intensity lands, other allowable cut levels were considered. These levels relate to the alternative land uses and practices discussed in Section 1.2.5 and in Chapter 8, Alternatives. Reference should be made to these sections to ascertain their quantified impact on the allowable cut.

Low Intensity Lands

A trial management program is proposed for approximately 490 acres of low intensity lands per year during the first decade. The proposed annual harvest of 0.86 million cubic feet (5 MM bd. ft.) from low intensity lands is based solely on a 10-year projection period. It cannot be viewed as sustainable in context with allowable cut calculation procedures previously described. Future decade harvest levels, if any, would be dependent upon the results of the trial program proposed for the 10-year management plan.

Due to the harsh site conditions, clearcutting would probably convert such areas to non-commercial forest classification. A two-stage shelterwood cutting system would be employed. After reproduction has become established the final harvest cut would be made.

All acceptable methods of site preparation, including slash burning and using herbicides, would be utilized where needed to assist in the establishment of new seedlings during the trial period.

Trials of other intensive forestry practices such as planting would be initiated on low intensity lands during the initial decade. Approximately 2,450 acres of shelterwood regeneration cut areas would be planted and it is estimated that approximately 1,200 acres would require replanting or interplanting during the trial period.

1.2.7 The Future Forest

With the exception of the acreage summarized in Table 1-8, harvest of the remaining old-growth timber would be completed on high intensity lands during the fifth decade. The forest of the JKSYUs would be dichotomous -- high intensity lands exhibiting one set of characteristics and lands categorized as low intensity and limited management exhibiting another.

Table 1-8

Estimate of the Acreage Possibly Containing Old-Growth Timber Which Would Remain Essentially Unaltered by the Ten-Year Plan

High Intensity Forest Management Lands	
Class I and II Streamside Buffers	1,285 acres
Spotted Owl Management Areas	2,176 acres
Protection of Other Raptors	352 acres
Special Botanical Areas	1,400 acres
VRM Class I Lands	130 acres
Potential Recreation Sites	2,200 acres
Low Intensity Forest Management Lands	43,000 acres
Limited Forest Management Lands	44,000 acres
Total	94,543 acres

Commercial forest lands excluded from the high intensity category probably would look much as they do today. The prescription for natural regeneration and two-stage shelterwood harvest would perpetuate the mixed coniferous, multi-aged forest configuration. Since there is no commitment in the proposal for continuation of trial harvest beyond the first decade, total effect and extent of harvest cannot be predicted.

Areas proposed for harvest in the high intensity category would be radically different from the present forest. On the basis of computer projection for the eighth decade, timber stands more than 70 years old would be rare. A typical 70-year old stand might exhibit the following characteristics:

Volume per acre	7,000 cu. ft. (40 M bd. ft. Scribner)
Average diameter (Dbh)	15-20 inches
Trees per acre	200-225

Stocking would be controlled by thinning throughout the life of the stands. Competition from grass, brush and non-commercial tree species would be controlled until commercial species attain dominance, usually within 20 years. The road system would be complete and provide ready access to all stands.

Because of the smaller tree sizes and the correspondingly smaller machinery needed to handle them, falling and yarding would have less impact on the site. In addition, better utilization and the small amount of cull material expected would mean that slash disposal problems, as now known, would not exist.

People and machinery would be present within the stands much more frequently than at present. The planting and nurturing of seedlings would be followed, where needed, by precommercial thinning in stands less than 30 years in age. Fertilization would follow on a 10-year cycle. Commercial thinnings would begin at about 40 years of age and be repeated on a 20-year cycle.

1.3 DESIGN FEATURES INCLUDED IN THE PROPOSAL

Table 1-1 displays the proposed 10-year plan of prescribed management treatments in a typical sequence, beginning with road construction or improvement. Following harvest, either by shelterwood, clearcut or single tree selection, the sequence of treatments reflects those actions necessary to facilitate prompt reforestation of the specific tract, and subsequent growth of commercial coniferous species. The following discussion of treatments will be in the same order as listed in Table 1-1.

Not every treatment listed in Table 1-1 would be applied to every acre. An infinite number of treatment combinations is possible and could be employed. The purpose of this section is to elaborate on what each treatment entails and quantify, to the extent possible in a regional environmental statement, the magnitude of the actions. Treatments would be identified and scheduled through application of the Operations Inventory system. Determination of treatment needs for those actions to be required in the sales contract would be accomplished during timber sale planning.

Contracts, usually awarded on a competitive basis, are the vehicle for accomplishment of all timber harvest and many forest development practices. The standard and special provisions in a contract set forth the specifications to be followed by the contractor in carrying out the action in accordance with applicable laws, regulations and policies.

In contract preparation, selection of special provisions is governed by the scope of the action to be undertaken. Stipulations define the methods and manner for accomplishing the action. Contract sections dealing with road construction, type of harvest to be employed on a specific soil type and other soil related issues are governed by Medford District's Recommended Watershed Practices (see Appendix D). The provisions of the basic timber sale contract, Bureau form 5450-3 (see Appendix E), are applicable in all cases. Bureau manuals and manual supplements provide a variety of approved special provisions for use, as appropriate, in individual contracts. The combination of selected special provisions constitutes Section 41 of Form 5450-3.

Land use allocations and constraints on lands allocated to timber production, such as those discussed in Section 1.2.5, are implemented through project design. A principal means for determination of applicable special provisions during preparation of a contract for a forest practice is the environmental assessment (EA). Refer to Section 1.5.3 for a discussion of specific action EAs.

In accord with BLM policy (Manual Section 6840), no actions would be taken which would adversely affect the continued existence of any Federally-listed

threatened or endangered animal or plant species. BLM also complies with Oregon laws pertaining to State-listed species. Thus, where data are sufficient regarding these species, no adverse action would be taken that would impact the species. Prior to each timber sale, site specific environmental assessments are prepared in an attempt to locate any threatened or endangered species. If any are located formal consultation with the U.S. Fish and Wildlife Service as prescribed by Section 7 of the Endangered Species Act, will occur.

As with threatened or endangered species, special surveys are required for evidence of historic or prehistoric human occupation. A Class III (complete survey) cultural resources inventory is required of all areas to be subjected to ground manipulation activities. This is accomplished in the pre-planning stage of a treatment and results analyzed in the EA addressing the action. (BLM Manual 8100, Cultural Resources Management)

When a cultural resource is discovered during a timber harvest or associated activities, operations in proximity are immediately suspended and may only resume upon receipt of written instruction from the authorized BLM officer.

1.3.1 Transportation System

On the average, 37.5 miles of new permanent road would be constructed annually during the 10-year period. Standards, i.e., width of running surface, ditches, fills and type of surfacing, if any, remain to be determined.

Since portions of the existing road system are underdesigned, obsolete or unsafe, approximately 100 miles of road would be reconstructed during the proposal period. Approximately 50 miles of existing road would be surfaced. Types of surfacing are unknown.

1.3.1.1 Scope of Treatment

Based on average construction experience in the JKSYUs, one perennial stream and three intermittent stream crossings would be involved in each mile of road construction or reconstruction. The breakdown, by stream classes as used in Table 1-6, Issue I, is as follows.

Stream Class	Interval
Class I	1 per 20 miles of road
Important Class II	1 per mile of road
Other Class II	3 per mile of road

By the end of the proposal period, the permanent road system would be essentially completed. Reconstruction of portions of the system could be required based on use and other factors. Resurfacing would take place as necessary.

1.3.1.2 Project Design Features

An Oregon Manual Supplement, Release 5-115 of April 10, 1975, would be used in preparing road construction requirements for timber sale contracts. All engineering terminology and types of construction equipment are defined in the manual supplement and specifications for all aspects of construction, reconstruction and surfacing are provided.

Methods of slope protection are provided to avoid collapse of cut and fill embankments. Specifications for rock pits and quarries include provisions for minimum visual intrusion, drainage and control of runoff and restoration following use.

Special stipulations are provided for the installation of stream crossing structures such as corrugated metal culverts so that fish passage is not impeded. These measures may include imposing gradient limitations for the structures and/or installing baffles to reduce water velocity through the culverts.

One section of the manual supplement provides design features to control and minimize erosion during road construction and throughout the design life of the road. Another section addresses soil stabilization practices including planting, seeding, mulching and fertilization for establishment of soil binding vegetation.

1.3.2 Timber Harvest

Two-stage shelterwood and single tree selection harvest techniques would be employed on both high intensity and low intensity lands. Clearcutting would be employed only on high intensity lands and then only on areas determined by the Operations Inventory to be suitable.

1.3.2.1 Scope of Treatment

The regeneration cut of a shelterwood harvest would remove from 30 to 60 percent of the original stand basal area. Maximum removal on south or west slopes would be 50 percent. An average of 2,230 acres of high intensity land would undergo a regeneration cut each year. For low intensity lands, the trial harvest would average 490 acres per year.

Approximately 765 acres undergoing regeneration cut each year would be new areas previously undisturbed by humans. The balance of regeneration cutting would be in areas having experienced some disruptive activity such as initial entry under the three-stage shelterwood system previously employed.

Previous observations of areas following initial entry under a three-stage shelterwood approach show that most mortality is attributable to damage suffered during logging. With two-stage shelterwood it is expected that damage would be lessened since the heavier regeneration cut allows more room in which to fell timber and operate equipment.

Natural mortality occurs in all timber stands. Shelterwood systems allow the removal of trees judged to be most susceptible to insects, disease or windthrow during the regeneration cut. Under the proposal it is estimated that one tree per acre per year would die between the regeneration cut and the final harvest cut. No special salvage program is planned for high intensity lands since final harvest would take place as soon as the new stand is established. Average volume loss is estimated to be 10 board feet per acre per year due to deterioration of dead trees prior to their salvage during final harvest cut.

Final harvest cut would take place after establishment of a new stand containing at least 300 commercial coniferous trees per acre, approximately 4 years for high intensity lands. Reforestation would be by planting following the regeneration cut. Reforestation of low intensity lands would be dependent on natural seeding, planting, and seed spotting. No final harvest cutting is anticipated on low intensity lands during the proposal period.

Of the 32,800 acres of high intensity lands scheduled to receive final shelterwood harvest, approximately 10,500 acres are composed of two-storied stands. The overstory would be removed from these stands leaving a fully-stocked understory of younger trees.

A total of 47,700 acres of high intensity lands would receive shelterwood harvest during the decade. Of this total, approximately 7,400 acres would be entered twice within the proposal period, and would receive both a regeneration and a final harvest cut.

Clearcutting of high intensity lands would average 400 acres per year during the proposal period.

Single tree selection would average 90 acres annually on high intensity lands during the proposal period. Maintenance of a multi-storied stand is a major objective of this harvest method. It would be applied primarily to frost pockets and areas of heavy gopher infestation.

1.3.2.2 Project Design Features

Harvest planning assures that sale area design meets the visual resource management class objectives for the vicinity. Harvest planning requirements regarding threatened and endangered species and cultural resources are as discussed in Section 1.3.

Oregon Manual Supplement 5424 lists special provisions or stipulations for use in the logging requirements portion of a timber sale contract. It is estimated that 65 percent of the proposed harvest in the JKSYUs would be accomplished by cable yarding systems with tractor yarding systems employed for the remainder. The availability of a variety of logging systems is a design feature primarily to reduce soil damage. Refer to the BLM Timber Management Final Environmental Statement (FES 76-49) for a detailed description of logging systems.

Logging provisions available for use in Section 41 of the timber sale contract provide for a wide variety of situations which may be encountered on a particular sale area. Advance notice to the BLM prior to beginning or ending of operations is normally required. Timing of completion in a cutting area, maximum length of logs for yarding and type of equipment to be used may be stipulated to reduce damage to the site and the remaining trees.

A group of special provisions is available to protect specific values. These may prohibit yarding through streams or specific areas. Locations for landings may be limited. Time of year or operating conditions, e.g. dry soil, may be specified.

1.3.3 Slash Disposal

Provision for disposal of slash (unutilized logging residue) is contained in most timber sale contracts. Determination of specific requirements and extent of treatments to be employed is a function of planning for each specific sale.

1.3.3.1 Scope of Treatment

Broadcast Burning

Disposal by burning would take place on approximately 2,370 acres of high intensity lands per year. Slash disposal on high intensity lands would need to be directed beyond the requirement of fire hazard reduction. Emphasis would have to be placed on making such lands accessible to planting crews and preparing planting areas by reducing competitive vegetation.

Gross Yarding

Gross yarding may include several actions depending on the particular circumstances of the timber sale. The primary objective of gross yarding is to remove cull material from the timber sale area so that additional growing space may be made available for young trees. Normally the requirement is to yard all material larger than 8 inches in diameter and 8 feet long. Concentration points for such material are designated on landings, skid roads or other appropriate places. Material thus piled may be burned, resold after contract termination or utilized by firewood cutters. The treatment is effective for both shelterwood and clearcut harvest techniques and applicable to both cable and tractor logging methods.

Machine Piling

Machine piling is employed on terrain suitable for tractor operations (side-slope less than 35 percent) to bunch slash preparatory to burning. Generally a brush blade is installed on the tractor in lieu of the standard bulldozer blade. These blades are fitted with teeth which minimize soil displacement and reduce the amount of soil in the piles.

In areas of identified soil compaction, such as on landings and major skid roads, soil ripping to a depth of 12 to 24 inches may be required.

In sale areas containing intermingled areas of brush within the cutting area, mechanical scarification of such areas may be required. The discussion of mechanical scarification in Section 1.3.4.1 is pertinent.

An average of 3,300 acres per year of high intensity lands would be treated by gross yarding including machine piling.

1.3.3.2 Project Design Features

Section 15 of Form 5450-3 is the standard provision for fire protection and slash disposal. Numerous special provisions are available for use in a contract. Included are provisions for hand or machine piling, gross yarding to specific diameters and lengths, special piling and burning along roads and disposing of slash in accordance with written instructions from BLM.

The written instructions (or slash plan) are prepared jointly by BLM and the Oregon State Department of Forestry (OSDF). A burning permit is not required when BLM assumes supervisory responsibility for slash disposal. When supervisory responsibility is delegated to the timber purchaser, the purchaser must obtain a burning permit from OSDF prior to undertaking slash disposal. Burning is conducted in accordance with the Oregon Smoke Management Plan (see Section 1.5.2.1).

Through an agreement with the State Forester, it is also possible for slash disposal on public lands to be supervised and performed by OSDF personnel.

1.3.4 Site Preparation

Site preparation improves the potential for plantation success by reducing competition for light, moisture and soil nutrients prior to or at the time of reforestation. Site preparation makes it easier to plant an area where the timber has been harvested and gives tree seedlings a much improved chance for survival and rapid growth in the absence or near absence of competitors. Brush fields and poorly stocked plantations resulting from plantation failures require brush and hardwood control to bring these lands into full timber production.

1.3.4.1 Scope of Treatment

Herbicides

Herbicides are used principally to control grass, forbs, brush and noncommercial tree species.

Herbicides are applied aerially or by several ground methods. The method selected is dependent on costs, topography, limits of the equipment, kind and dispersion of target plants, potential environmental impacts and biological conditions.

Most of the herbicides proposed for use in the JKSYUs would be applied by helicopters equipped with positive shut-off spray systems to limit herbicides to the target areas. Helicopter application would be accomplished under contract through competitive bidding processes.

Combinations of herbicide are used as recommended by knowlegeable scientists. Combinations permit a broader range of effectiveness when there is a range of target species beyond the capability of a single chemical.

Herbicides, as single chemicals or in combination, would be used for high intensity lands site preparation at a rate averaging approximately 1,650 acres per year. An estimated 980 acres of low intensity lands would be treated during the proposed trial period. Table 1-9 shows the chemicals, target species and estimated acreage of herbicide use proposed for the JKSYUs during the 10-year period. Acreage by chemical combination remains to be determined.

Mechanical Scarification

Mechanical scarification consists of piling and/or windrowing brush and is normally accomplished with brush blade equipped bulldozers. To be acceptable, these operations must be restricted to: (1) slopes generally less than 35 percent due to equipment limitations and serious erosion hazards attendant to bare, exposed soils; (2) dry soil conditions; and (3) suitable soils.

Approximately 22,300 acres of mechanical scarification are planned during the proposal period, most of which will be accomplished through timber sale contract requirements.

1.3.4.2 Project Design Features

Only Federally registered pesticides may be used on public lands except as authorized by Section 24c of Public Law 92-516 (The Federal Environmental Pesticide Control Act of 1972). Section 24c provides for State registration of certain pesticides for local needs within the State. Any pesticide proposal planned under a State registration must include a copy of the State label.

In accordance with the decision of the Secretary of the Interior regarding the use of herbicides in western Oregon (FES 79-6) silvex will not be used. The Department of the Interior has not used the herbicide 2,4,5-T since 1972 and that prohibition continues.

Specific projects for herbicide use in the JKSYUs are developed in the Medford District Office. All proposed use of herbicides on public lands will be reviewed for approval in advance by the Bureau's Denver Service Center and/or Washington, D.C. office.

Table 1-9

Estimated Ten-Year Use of Herbicides

Chemical 1/	Active Ingredient Pounds	Site Preparation 2/ Estimated Acreage	Stand Release 2/ Estimated Acreage	Target Species
2,4-D 3/	34,000	10,000	7,200	Madrone Hazel Ocean Spray Blackberry Ceanothus spp Tan Oak Canyon Live Oak Chinkapin
Roundup	1,500	2,500	1,800	Blackberry Alder Swordfern Brackenfern Vine Maple
Krenite	6,000	2,500	1,800	Alder Blackberry Vine Maple Wild Rose Thimbleberry Brackenfern
Atrazine	26,450	6,200	2,100	Grass
Dalapon	12,600	2,100	1,500	Annual Grasses Forb

1/ For a further discussion of these chemical herbicides, refer to BLM's ES entitled Vegetation Management with Herbicides: Western Oregon - 1978 through 1987 (USDI, BLM 1978d).

2/ Chemicals are often used in combination, therefore totals shown here will not equate with treatment acreages of Table 1-1.

3/ Only the low-volatile esters approved for use in forestry applications would be used.

Proposed decisions of the Jackson-Klamath Management Framework Plan (see Section 1.2.5) are very specific with regard to site preparation. They prohibit aerial spraying within 100 feet of live streams and treating of an entire drainage within a short period of time. Limitations are placed on mechanical scarification based on soil, topography and proximity to streams.

Timing of herbicide treatment is stringently controlled. Weather conditions, humidity and wind are tightly specified. There is full authority for ordering cessation of operations based on adverse field conditions. Both equipment employed and equipment operators are frequently checked by field project supervisors.

A discussion of specific design features included in herbicide project plans and contracts for application can be found in BLM's Final ES Vegetation Management with Herbicides: Western Oregon - 1978 through 1987.

1.3.5 Planting

1.3.5.1 Scope of Treatment

To achieve adequate reforestation within the assumed 4 years following harvest on high intensity lands, harvested areas would be planted with commercial coniferous species within 1 year of the completion of harvesting. Planting stock is nursery grown from seed collected on sites and at elevations similar to the specific project area.

Planting prescriptions would be designed to regenerate a new stand which resembles the harvested stand in species composition. In the Jackson SYU this would require 74 percent Douglas-fir, 21 percent ponderosa pine and 5 percent white fir. The white fir would be used predominantly in that portion of the SYU which borders the Klamath SYU.

Seedling mix in the Klamath SYU would be 32 percent Douglas-fir, 28 percent white fir, 25 percent ponderosa pine and 15 percent Shasta red fir. To meet specific site regeneration problems in the SYU, especially on the Dead Indian Plateau, minor amounts of lodgepole pine, Jeffrey pine, western white pine, sugar pine and incense cedar may be employed. The proposal calls for planting approximately 32,850 acres undergoing shelterwood regeneration cut or clearcut.

More than 11,000 acres of high intensity lands are presently nonstocked or understocked (minimum acceptable stocking ranges from 245 to 320 seedlings per acre). Adequate reforestation of backlog acreage is an important aspect of the proposal. Project areas in this category would generally require site preparation prior to planting.

Reforestation experience in the JKSYUs shows that adequate stocking of 300 trees per acre cannot always be achieved by the initial planting. An estimated 13,400 acres would require replanting or interplanting during the proposal period.

Loss of seedlings during shelterwood final harvest cut is expected to be moderate. Final harvest would not take place until adequate stocking is achieved. Normally, the underplanted population would exceed 300 trees per acre. Nevertheless, interplanting following final harvest has been considered in generating the 13,400-acre figure for replanting.

1.3.5.2 Project Design Features

Primary project design features associated with planting deal with the care of stock prior to planting and methods of tree placement. Each planting area is sampled for adequacy of spacing. Payment adjustment factor is directly tied to quality of planting.

Post-treatment surveys are conducted to determine rate of survival. If inadequate, replanting or interplanting may be undertaken.

1.3.6 Gopher Control

In certain areas of the JKSYUs, pocket gophers have been found to have a major limiting impact on reforestation (Williamson and Minore 1978). Openings created by harvest or wildfire and the successional vegetation that follows improve gopher habitat. Thus, gopher densities can be high when seedlings are young and most vulnerable.

1.3.6.1 Scope of Treatment

Gopher control operations are proposed for approximately 9,000 acres (6,500 acres in the Jackson SYU and 2,500 acres in the Klamath SYU). Underground application of strychnine-treated oat bait applied in conjunction with herbicide site preparation is the preferred method. Assuming sufficient kill, baiting would be conducted only once on each area.

1.3.6.2 Project Design Features

Strychnine alkaloid is quite stable and almost insoluable in water. It is odorless, tastes bitter and is not absorbed through the skin. This pesticide has been approved by the U.S. Department of the Interior's Intradepartmental Pesticide Working Group and the Interdepartmental Working Group on Pesticides which is responsible to the Council on Environmental Quality. (This approval is only of the pesticide, not of the proposed project.) Bait is obtained from Animal Damage Control Personnel of the U.S. Fish and Wildlife Service. Prior to application, the Oregon Department of Fish and Wildlife is notified.

The bait would be deposited underground using hand-baiting machines. These machines allow the operator to locate the runway and deposit the bait in the

same operation. The baits are not removed and, according to Howard Tietjen (personal communication, U.S. Fish and Wildlife Service 1979), may remain toxic for 30-90 days.

Permanent monitoring plots are established prior to baiting. These plots are checked once a week for 2 weeks following baiting. Thereafter, they are checked every other month for a period of 3 years in conjunction with reforestation surveys.

The following procedures would be required on all treatment areas:

- Only personnel licensed by the State of Oregon would handle the bait. This includes refilling the bait machines.
- A licensed applicator would be on the site at all times.
- All personnel would be trained in locating active burrows.
- All personnel would be trained and be familiar with safety precautions and hazards of the bait.
- Baiting would be done early in the day to facilitate finding active runways.
- Application usually takes place in the fall, but experimental spring baiting may be tried.
- The poisoned bait would be stored in a locked metal box or can at all times.
- All personnel would be required to wear gloves and coveralls (those handling bait would wear a dust type respirator). These would be stored in a metal can when not in use.
- Any spilled grain (bait) would be immediately buried.
- All food would be consumed away from the treated site.
- Soap and water would be provided for all personnel.
- A minimum 10-foot buffer beyond the high water level would be left along all bodies of water.

1.3.7 Herbicide Release

Release is the reduction of competition for light, moisture and nutrients between shrubs or grass and existing commercial coniferous seedlings. Fast-growing trees, such as red alder or vine maple, overtop and suppress slow-starting conifer seedlings. The degree and type of competition varies

with the individual site. On dry sites, grass competes effectively for water, while elsewhere hardwoods grow rapidly enough to shut out essential light and compete for water during the dry summer. In recent years, herbicides have been used effectively to inhibit the growth of competing vegetation, thus increasing available water, nutrients and light for suppressed conifers.

1.3.7.1 Scope of Treatment

With reduced competition, the conifers rapidly grow beyond the point where they can be overtopped and further suppressed by surrounding vegetation. When this growth situation is achieved, there would be no further control of competing vegetation. Herbicide release spraying is proposed for an average of 1,190 acres per year of high intensity lands. An estimated 25 acres per year of low intensity lands would be treated during the proposed trial period. (Table 1-9 lists the chemicals to be employed.)

1.3.7.2 Project Design Features

Project design features are the same as for site preparation using herbicides.

1.3.8 Precommercial Thinning

Precommercial thinning would be applied to commercial timber stands less than 30 years of age which contain over 400 stems per acre less than 5 inches in diameter. This treatment concentrates available nutrients, moisture and light into those trees which would be the eventual crop for the next harvest.

1.3.8.1 Scope of Treatment

The number of trees per acre removed during precommercial thinning is dependent on the biological productivity of the area and tempered by plans to conduct commercial thinning later. Least productive sites would be thinned more heavily since commercial thinning at a later time is less likely. While average spacing is approximately 12 feet by 12 feet, the number of crop trees left may vary between 245 and 320 per acre. Precommercial thinning is planned for an average of 800 acres per year.

1.3.8.2 Project Design Features

Contract specifications or field instructions to BLM crews cover desired spacing of crop trees and criteria of crop tree selection. Seldom are crop trees individually marked although this may be the approach when dealing with a new contractor or crew.

1.3.9 Fertilization

Fertilization is planned for areas that undergo thinning. Detailed on-site soil analysis would be employed to determine composition of fertilizer needed, rate of application, and timing between applications. Average application is expected to be 200 pounds of nitrogen per acre at 10-year intervals.

In addition to acceleration of growth for up to 7 years following fertilization, the treatment tends to reduce shock associated with thinning. Approximately 23,185 acres would be fertilized during the proposal period. Fertilizer would not be applied within 100 feet of a perennial stream.

1.3.10 Commercial Thinning

In order to maximize the production of forest products, stands ranging in age from 30 to 90 years would be commercially thinned under terms of timber sale contracts at 20-year intervals. At the first thinning, the crop trees would be 9 to 11 inches in diameter. In the process, suppressed, intermediate and some codominant trees would be sold and removed. Timing of thinning would be dictated by degree of crown closure and growth rate, with reduced growth rate being a primary indicator. Following one or more commercial thinnings, the final crop at age 90 would consist of 200 to 225 trees per acre.

Over 15,000 acres would be scheduled for commercial thinning in the 10-year plan. See Section 1.3.2.2 for a discussion of design features of a timber sale contract.

1.4 MONITORING AND RESEARCH

1.4.1 Monitoring

The Bureau of Land Management monitors land management practices primarily through administration of the contracts under which most actions are authorized. Timber sale contracts are visited at least once a week when active and more often if sensitive operations are in progress. Daily administration visits are not uncommon when harvest is moving at a fast pace, slash disposal is occurring, and road construction involving critical aspects such as stream crossing structures is taking place. Daily visits also occur when there is reason to believe that the operator will require help in the interpretation of contract requirements.

Contracts for tree planting and precommercial thinning are monitored at regular intervals to determine the quality and quantity of work accomplished. Visits to these operations range from twice a week to the full-time presence of a Bureau contract administrator depending on the experience of the contractor and rate of progress.

Monitoring of herbicide application is as described in the final ES Vegetation Management with Herbicides: Western Oregon - 1978 through 1987 (USDI, BLM 1978). Continuous administration of spraying contracts in progress is required. Water samples of adjacent streams are taken prior to spraying and at specified intervals thereafter.

Evaluations of field operations are conducted periodically by higher level offices to assure that all aspects of policy and procedure are adhered to and an acceptable level of compliance is attained.

1.4.2 Research

BLM is not a direct research agency and does not employ scientists whose primary duties are to conduct research. Research needs are identified by managers and resource specialists who recognize problems relating to resource management. Proposals for research are prepared and the work is contracted to agencies, institutions or companies equipped and prepared to do the problem resolution. Often a research organization is interested in the same or similar problem and the investigation is jointly funded. When practical, BLM research needs are integrated into existing U.S. Forest Service Experiment Station programs.

A new and ambitious forest research program has recently been developed. Entitled Forestry Intensified Research (FIR), it is a cooperative effort of forest management agencies, forest research institutions and timber industry companies and associations in southwestern Oregon.

The program prospectus was prepared by representatives of the Medford District of the Bureau of Land Management, the Rogue River National Forest, the Medford District of the Oregon State Department of Forestry, the Oregon State Forest Research Laboratory, the Pacific Northwest Forest and Range Experiment Station and the forest industry.

The objective of this Forestry Intensified Research (FIR) plan is Intensive Forestry for Southwest Oregon -- Research for the New Forest. This objective would be approached through a major, integrated program in two phases planned over a 10-year period. Administrative responsibility for the program would be shared by Pacific Northwest Forest and Range Experiment Station (PNW) and the Oregon State Forest Research Laboratory (FRL), with PNW the lead agency.

Phase I, entitled, "Adaptive Research and Information Transfer" has been established under the direct leadership of Oregon State University. The second phase, "Fundamental Research," will be administered by PNW and integrated with the initial "Adaptive Research" phase.

The research objective will be reached by pursuing the following primary target areas:

(1) Local adaptive research, integrated with (2) and with regional research elsewhere.

(2) Fundamental research on priority problems.

(3) Better information sharing between researcher-forester and field-forester.

(4) Local tests of new, integrative practices; practices derived from synthesis of results of logging, soils, regenerations, etc. research; large scale, operational tests and demonstrations of these practices.

1.5 INTERRELATIONSHIPS WITH OTHER PROGRAMS

This section discusses two kinds of relationships: those between the BLM timber management plan and other BLM plans and programs; and those between the BLM timber management plan and related plans and programs of other parties. The only BLM action required to implement the proposal is a formal declaration of the allowable cut. No other Federal, local or State agency must endorse the plan before implementation. However, in the process of plan development (see Section 1.2.5) several governmental agencies were consulted to determine compatibility with their respective plans and interests and to gain assistance in resolution of potential conflicts.

1.5.1 Planning Interactions

The Intergovernmental Cooperation Act of 1968 requires the fullest cooperation and coordination among all levels of government. The law directs all Federal agencies to notify State and local governments of significant project or development plans. This is accomplished through the Oregon State Clearinghouse which distributes project or plan documents to involved State agencies. The Medford District has furnished the clearinghouse with copies of land use planning documents and annual timber sales plans.

County planning and zoning programs within the SYUs are fully described in the Jackson-Klamath Planning Area Analysis. Each of the four counties which contain a portion of the JKSYUs uses slightly different names for the proposed zone designation encompassing public lands administered by BLM. the zone designations provide for timber production, grazing and other uses, including recreation. Current county zoning in each case is compatible with existing and anticipated BLM land use programs.

Oregon Senate Bill 100 requires that local governmental units establish a mechanism for cooperating with Federal agencies in the development of comprehensive land use plans. Cities and counties must contact all State and Federal agencies within their jurisdiction for this purpose. All counties and

cities in Oregon are required further to develop and adopt comprehensive plans and land use controls consistent with statewide planning goals and guidelines. The regulating authority under SB 100 is the Oregon Land Conservation and Development Commission (LCDC). The relationship of the proposed action to LCDC goals is displayed in Table 1-10.

The LCDC has specified that a city or county may have only one comprehensive plan and that it must include the plans of all affected special districts, State, and Federal agencies. Although none of the counties have completed revision of their comprehensive plans or gained LCDC approval, BLM routinely reviews and comments on draft plans as they are made available.

Although BLM has no authority to enter into binding commitments to be guided by comprehensive plans developed under State law, the mandate of the FLPMA practically assures BLM consistency with State and local comprehensive plans.

1.5.2 Interactions With Other Actions or Proposals

1.5.2.1 Other Agency Actions or Proposals

In addition to BLM, other agencies have jurisdiction over lands within and adjacent to the JKSYUs. BLM cooperates with these agencies as far as possible to avoid conflicts and to insure wise use of natural resources. BLM interactions with these agencies and their current projects or proposals are described below.

Timber Management Plans

Most of southwest Oregon is timber producing land. In addition to the BLM, jurisdictions include the U.S. Forest Service, National Park Service, State of Oregon, the counties, and private individuals and companies. Each entity approaches management of timber lands differently although most periodically prepare internal or public plans for their management.

Summary data of timber harvest and management treatments have been gathered for the Rogue River Basin of which the JKSYUs are a part. BLM administers approximately 30 percent of the Rogue River Basin. Over 369,000 acres lie within the JKSYUs and the balance is within the Josephine Sustained Yield Unit. Table 1-11 shows the estimated acreage of annual timber management treatments within the basin based on recent years' averages by jurisdiction. The state and private column includes only major private landowners as no data are available for small timberland ownerships.

BLM administered land within the Klamath SYU constitutes less than 2 percent of the Klamath River Basin, therefore no comparable data was gathered in the Klamath Basin.

Table 1-10

Relationship of the Proposed Action to Statewide (LCDC) Goals

LCDC GOALS		DISCUSSION
I.	To insure citizen involvement in all phases of the planning process.	Citizen involvement occurred throughout the planning process, including public meetings in Medford, Klamath Falls, Butte Falls, Rogue River Shady Cove, Keno and Ruch.
II.	To establish a land use planning process and policy framework as a basis for all decisions and actions.	The Federal Land Policy and Management Act and the Bureau's planning system provide such a process and framework. The proposed action has resulted from this process.
III.	To preserve and maintain agricultural lands.	The proposed action would not affect the use of agricultural lands in the area.
IV.	To conserve forest land for forest uses.	The proposed timber management plan is consistent with this goal. It stems from a proposed land use plan which provides for all of the forest uses defined in this goal statement.
V.	To conserve open space and protect natural and scenic resources.	The forest management practices proposed are inherently conservative of open space. The proposed underlying land use plan provides for preservation of natural and scenic resources considered significant. Some others considered of lesser significance would not be preserved.
VI.	To maintain and improve the quality of the air, water and land resources.	The proposed action and underlying land use plan provided for maintenance of the quality of these resources, through use exclusion from sensitive areas and special management practices elsewhere.
VII.	To protect life and property from natural disasters and hazards.	Protection of hazard areas is provided for in the proposed action.
VIII.	To satisfy the recreational needs of the citizens of the State and visitors.	The proposed underlying land use plan provides for some recreational needs.
IX.	To diversify and improve the economy of the State.	Given the potential of the lands, the proposed land use plan seeks to achieve a balance in the production of economic resources from them. These resources mainly are timber, recreation and anadromous fishery. The proposed timber management plan would result in markedly reduced levels of timber harvest with consequent adverse short-term impact on the economy. Since the reduced harvest level will be sustainable, it will contribute to long term economic stability.
X.	To provide for the housing needs of the citizens of the State.	Although reducing the amount of wood harvested from the area, the proposed action does provide for a harvest sustainable over the long term.
XI.	To plan and develop a timely, orderly, and efficient arrangement of public facilities and services.	The proposed action would not affect public facilities and service.
XII.	To provide and encourage a safe, convenient and economic transportation system.	The forest transportation system would be maintained and improved.
XIII.	To conserve energy.	Conservation and efficient use of energy sources are objectives in all BLM activities.
XIV.	To establish urban growth boundaries.	The establishment of urban growth boundaries would not be affected.

Table 1-11

Annual Timber Harvest and Management Treatments by Major Ownership

Rogue River Basin (Approximately 2,421,000 acres)

	BLM	USFS	State & Private	County	Total
Present Harvest (MM bd.ft.)	232	269	171	3	675
Shelterwood Harvest					
Acres	8,000	7,850	49,400	0	65,250
Volume	212	143	34	0	389
Clearcut Harvest					
Acres	500	4,700	12,350	0	17,550
Volume (MM bd.ft.)	15	118	137	0	270
Site Preparation (acres)					
Herbicide	450	400	1,200	0	2,050
Mechanical Scarification	50	550	1,000	0	1,600
Slash Disposal (acres)	800	-	2,000	35	2,835
Herbicide Release (acres)	450	2,600	2,000	-	5,050
Planting (acres)	2,800	7,550	3,000	540	13,890
Precommercial Thinning (acres)	400	1,300	2,500	2,700	6,900
Commercial Thinning (acres)	200	650	2,000	0	2,850
Fertilization (acres)	0	0	0	20	20
Road Construction (miles)	100	107	20	2	229

Source: Based on estimates provided by: BLM - Medford District; USFS - Rogue River National Forest and Siskiyou National Forest Supervisor's Office; Oregon State Forestry Department - Southwest Oregon Unit; and the Jackson County Forestry Department.

Coordination of planning is achieved through interagency involvement pursuant to authorities discussed in Section 1.5.1. Private actions on private lands are regulated, as provided by applicable State law, by Oregon agencies responsible for implementation of each statue.

Other Plans

A proposed U.S. Army Corps of Engineers reservoir on Elk Creek, northeast of the community of Trail, is presently in the active, but unfunded category. Construction bids were withheld in 1975 upon request by the State of Oregon until further water quality studies could be conducted and evaluated. If construction proceeds, approximately 210 acres of BLM administered land presently in the timber base would be withdrawn for reservoir construction.

Construction of the Applegate dam near the community of Copper began in May 1978, and is scheduled for completion in October 1981. The Applegate dam, together with the Lost Creek dam (already completed by the Corps) and the proposed Elk Creek dam, constitute the Rogue Basin Flood Control Project. Lands for the Applegate and Lost Creek Projects have already been withdrawn from the timber base.

Other Agency Roles in BLM Actions

Authorities and responsibilities of other agencies are recognized in the preparation of specific management actions to be carried out under provisions of the proposal. While no other agency must endorse the overall management plan prior to its implementation (Section 1.5.1), the agencies discussed below have a role, or provide guidance, in planning and carrying out the treatments listed in Table 1-1.

Federal Agencies

The Jackson and Klamath SYUs share in part a common boundary with the Rogue River, Winema, Klamath and Umpqua National Forests. Coordination between the BLM District Manager and the Forest Supervisors is routine. Specific project and program coordination takes place as needed between all management levels of each agency and also between resource specialists. A cooperative agreement provides for interagency road use and another agreement relates to range resource matters.

The Army Corps of Engineers has the authority, under Section 404 of the Clean Water Act of 1977 (P.L. 95-217), to regulate the discharge of dredged or fill materials into any wetlands or streams of the United States with flow in excess of 5 cubic feet per second. Normal silvicultural practices are exempt from regulation. Based on the adequacy of BLM environment protection practices, the Corps has issued BLM a general permit for all such activities. Under the permit, BLM provides the Corps, and certain environmental review agencies, with advance notice of specific projects.

The Bureau of Reclamation is also active in the development and maintenance of water resources in the Medford District. A cooperative agreement with

the Bureau has been drawn that assigns responsibility for management of lands at Hyatt Lake and Howard Prairie Reservoir to the BLM.

The U.S. Fish and Wildlife Service administers the Endangered Species Act of 1973. Accordingly, BLM contacts that agency when it is determined that a Threatened or Endangered Species may be affected.

The principal Small Business Administration (SBA) program interacting with BLM management in the JKSYUs is the timber sale set-aside program. The purpose of the program is to assure that small businesses (fewer than 500 employees) have the opportunity to purchase their historic share of timber sale offerings.

The Federal Highway Administration (FHWA) is responsible for survey, design, and construction of major roads and bridge projects for BLM. These are paid for with appropriate monies collected from road users and supplemented with appropriated funds.

Coordination of BLM access road projects is accomplished through the District Engineer in cooperation with the Oregon State Office of BLM and the FHWA.

State Government

The Oregon State Forester, by means of the Forest Protection Act of 1972, regulates timber harvest methods and supportive practices on all non-Federal lands within the SYUs. Minimum standards are prescribed relating to the following forest practices:

- Reforestation of economically suitable lands.
- Road construction and maintenance on forest land.
- Harvesting of particular tree species.
- Chemical applications.
- Slash disposal.

Although Federal agencies are not bound by State forest practice rules, Bureau minimum standards meet or exceed State rules. The BLM and USFS, acting jointly, have entered into a Memorandum of Understanding with the State Forester in this regard. Timber sale contracts provide for the purchasers, or their delegated representatives, to obtain permits for the operation of power-driven machinery from the Oregon State Department of Forestry (OSDF).

BLM is a cooperator in the statewide Smoke Management Plan administered by the Oregon State Forester. The primary objective of the plan is to keep smoke from slash disposal operations out of population centers. Slash burning is allowed to begin only when smoke dispersion conditions are determined by OSDF to be favorable.

OSDF is the primary contractor for fire protection of public lands administered by BLM in the JKSYUs. That department undertakes presuppression and suppression actions for all lands in the area.

The Oregon Department of Environmental Quality (ODEQ) has lead responsibility for statewide water quality management planning in accordance with Section 208 of P.L. 92-500 (Federal Water Pollution Control Act) as amended by P.L. 95-217 (Clean Water Act). BLM and ODEQ have entered into a Memorandum of Understanding which outlines their respective roles in meeting State water quality objectives. The Memorandum assures close interagency cooperation, development and implementation of appropriate practices and control measures to comply with the Clean Water Act, and compliance with State requirements. BLM forest management practices meet or exceed objectives of the statewide water quality management plan.

BLM has issued a right-of-way permit across Federal lands for a portion of the proposed 500-kV transmission line between the Medford and Malin Substations. The distance across BLM lands in the JKSYUs is 24 miles and involves approximately 252 acres of commercial timber land in the JKSYUs. The Oregon Public Utilities Commission (PUC) will be the State agency granting authority across State, county and private lands.

Management of wildlife, including fish, within the JKSYUs is the responsibility of the Oregon Department of Fish and Wildlife. BLM, in managing lands under its jurisdiction, considers wildlife habitat as a resource category. Cooperative agreements describe the responsibilities of the two agencies.

County Government

BLM involvement with the four counties in the SYUs is largely via the several boards of county commissioners. Through these bodies, county governments participate in planning for land use, road construction and recreational developments on public lands administered by BLM. They also develop and operate recreation sites on public lands leased under the Recreation and Public Purposes Act (see Figure 2-7).

1.5.3 Requirements For Further Environmental Assessment

This environmental statement may best be described as a regional programmatic statement for the proposed 10-year timber management plan. The environmental statement is considered applicable for the decade unless it is determined through the annual review process that the environmental effects are not adequately described.

The annual review process is accomplished through environmental assessment of detailed, site specific plans for each type of treatment under consideration for the year. Interdisciplinary impact assessment would be tiered within the framework of this statement. For instance, an environmental assessment of a timber sale, or group of sales, would address the effects of harvest method, yarding system, road construction or reconstruction, gross yarding, slash disposal and any other treatments such as mechanical scarification or ripping of compacted soils which would be conducted under terms of a timber sale contract. It may also discuss the environmental effects of planting when reforestation of the area is planned immediately after harvest.

Forest development treatments such as precommercial thinning, planting (areas other than those covered in timber sale assessments) and gopher control also receive site specific environmental assessment. Assessments addressing specific herbicide projects are prepared and tiered under BLM's FES entitled Vegetation Management with Herbicides: Western Oregon--1978 through 1987.

If the annual review through environmental assessment discloses that this timber management ES is inadequate or deficient, it may be supplemented, up-dated or completely re-written to reflect such known inadequacies or changes which have been made in the 10-year plan. This may be done at any time, but at least every 10 years (Section 1.1).

When an environmental assessment discloses that significant impacts cannot be readily mitigated or that the specific action involves a sensitive issue, a recommendation for preparation of a full environmental statement on the project may be appropriate. That project would not proceed until the decision is made on whether or not to prepare a statement. If an ES is to be prepared, the project would not proceed until the final statement is completed.

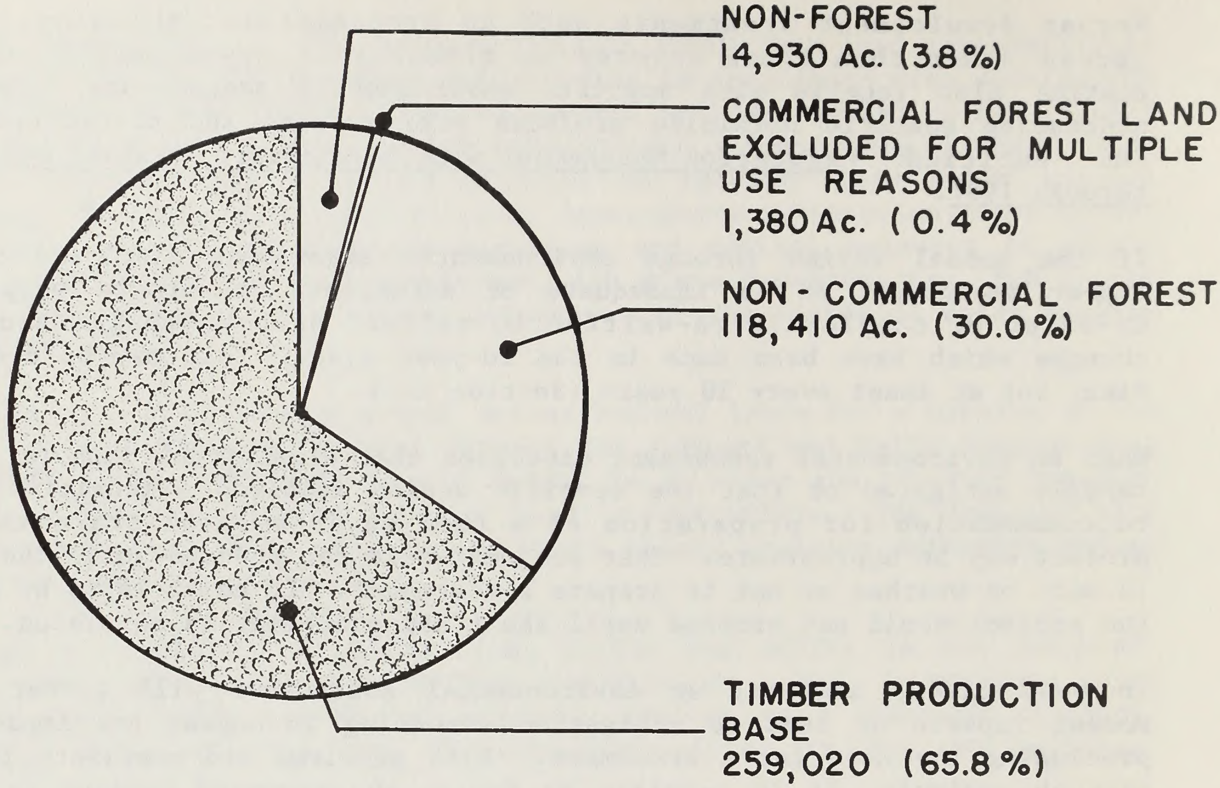
In most cases, however, an environmental assessment will either identify modest impacts or lead to mitigation resulting in modest net impacts, thus precluding the need for a statement. With problems and conflicts identified through analysis, it is possible to design the proposed project in an environmentally sensible manner. Where the action is to be accomplished by a contractor, the environmental assessment is a primary means for determining appropriate contract stipulations. Projects to be accomplished by BLM personnel are conducted in accordance with the findings of the assessment.

1.6 COMPARISON WITH PRESENT ALLOWABLE CUT

The present allowable cut plan for western Oregon was declared April 7, 1971, for application beginning July 1, 1971 (36 FR 6906). For all public lands administered by BLM in western Oregon the declared annual allowable cut is 1.172 billion board feet, Scribner equivalent. Based on forest resource conditions, other resource considerations, and environmental constraints specific to the Jackson and Klamath Sustained Yield Units, the present allowable cut for the SYUs is 128 million board feet per year (USDI, BLM 1970).

In comparing the 1971 declaration to the proposal, only the allowable cut on high intensity land may be considered. Volume from trial harvest on low intensity lands, while part of the proposal, was not arrived at through the allowable cut planning process.

In 1971, the timber production base (corresponds to high intensity lands of the proposal) was determined to be 327,270 acres following exclusions for other resource considerations. This figure compares to 258,597 acres in the proposed high intensity category, a difference of 21 percent. Figures 1-5 through 1-8 display land allocations to the timber production base in 1971 and in the proposal, respectively.



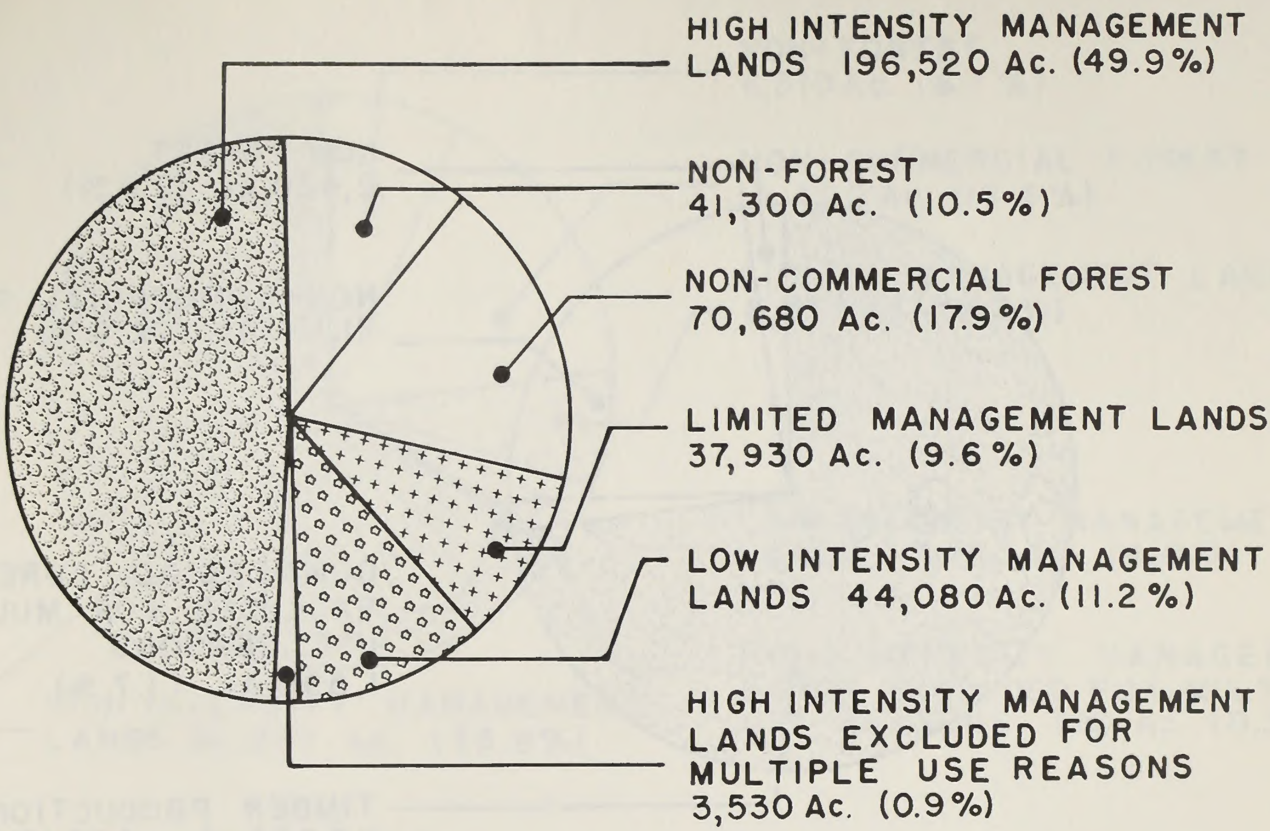
INVENTORY DATA:

- Total Inventory Volume — 5,060,000 Mbd. ft.
- Total SYU Acreage — 393,740 Acres
- Average Site Index — 113
- Stand Density Index — 68%

ASSUMPTIONS:

- Regeneration Lag — 0 Years
- 1st Decade Intensive Management Practices — None
- Ultimate Percent of Total Acreage to Undergo Thinning — 45%
- Ultimate Percent of Total Acreage to be Planted with Genetically Improved Stock — 29%

Figure 1-5 ACREAGE DISTRIBUTION USED IN THE 1970 ALLOWABLE HARVEST COMPUTATION FOR THE JACKSON SYU
SOURCE: BLM 1971



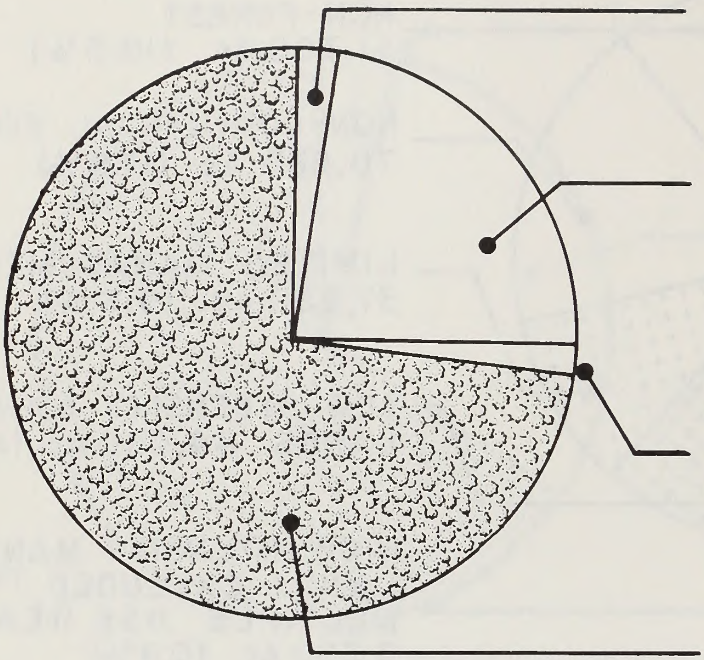
INVENTORY DATA:

- Total Inventory Volume —— 5,691,000 M bd. ft.
- Total SYU Acreage —— 394,040 Acres
- Average Site Index —— 113
- Stand Density Index —— 80 %

ASSUMPTIONS:

- Regeneration Lag —— + 4 Years
- 1st Decade Intensive Management Practices:
  - Precommercial Thinning —— 4,240 Acres
  - Commercial Thinning —— 7,925 Acres
  - Fertilization —— 12,165 Acres
- Ultimate Percent of Total Acreage to Undergo Thinning —— 72 %
- Ultimate Percent of Total Acreage to Undergo Fertilization —— 72%

Figure 1-6 ACREAGE DISTRIBUTION USED IN THE 1978 RECOMMENDED ALLOWABLE HARVEST COMPUTATION FOR THE JACKSON SYU
SOURCE: BLM 1978



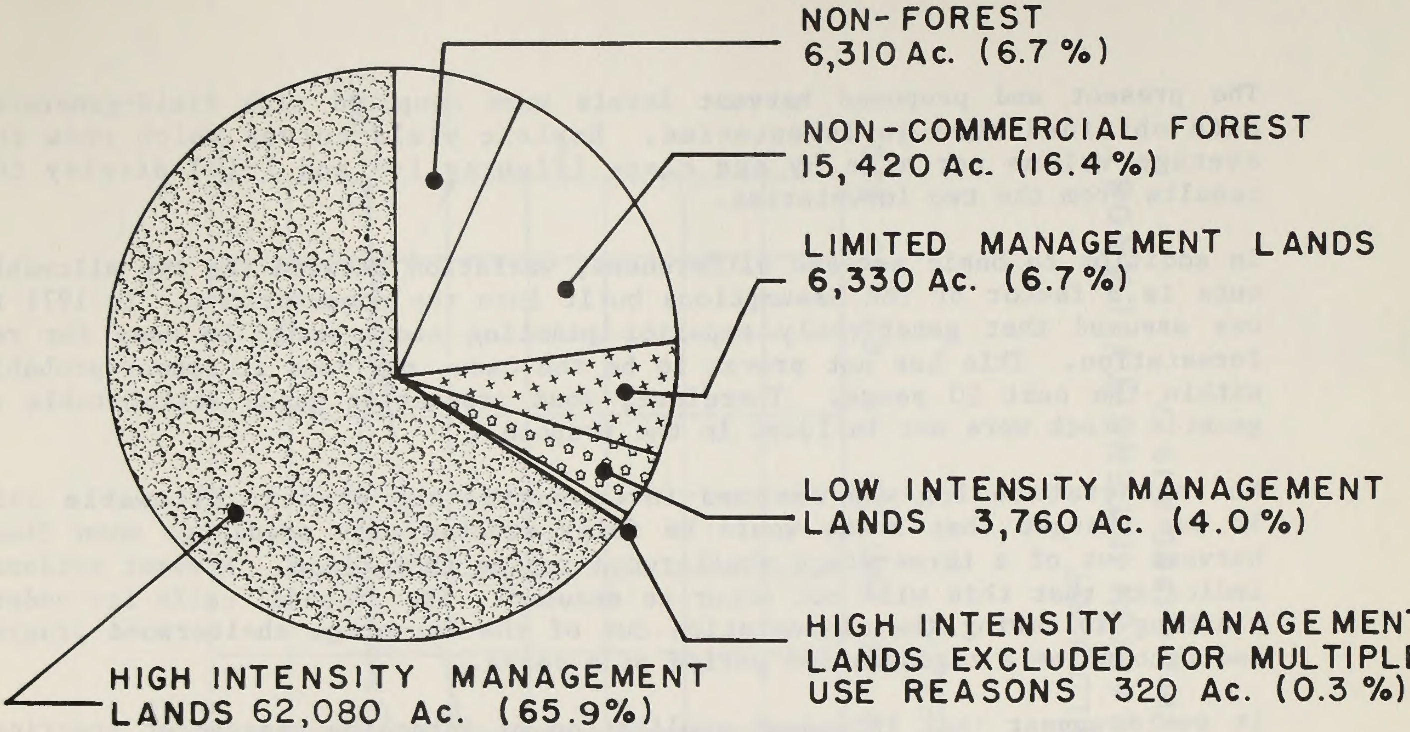
INVENTORY DATA:

- Total Inventory Volume — 1,577,000 Mbd. ft.
- Total SYU Acreage — 93,410 Ac.
- Average Site Index — 101 for Douglas-Fir
  62 for True Fir
  86 for Pine
- Stand Density Index — 68%

ASSUMPTIONS:

- Regeneration Lag — 0 Years
- 1st Decade Intensive Management Practices — None
- Ultimate Percent of Total Acreage to Undergo Thinning — 35%
- Ultimate Percent of Total Acreage to be Planted with Genetically Improved Stock — 41%

Figure 1-7 ACREAGE DISTRIBUTION USED IN THE 1970 ALLOWABLE HARVEST COMPUTATION FOR THE KLAMATH SYU
SOURCE: BLM 1971



INVENTORY DATA:

- Total Inventory Volume —— 2,106,000 Mbd. ft.
- Total SYU Acreage —— 94,220 Ac.
- Average Site Index —— 104
- Stand Density Index —— 84 %

ASSUMPTIONS

- Regeneration Lag —— + 4 Years
- 1st Decade Intensive Management Practices:
  - Precommercial Thinning —— 3,720 Acres
  - Commercial Thinning —— 7,300 Acres
  - Fertilization —— 11,020 Acres
- Ultimate Percent of Total Acreage to Undergo Thinning —— 70%
- Ultimate Percent of Total Acreage to Undergo Fertilization —— 70%

Figure 1-8 ACREAGE DISTRIBUTION USED IN THE 1978 RECOMMENDED ALLOWABLE HARVEST COMPUTATION FOR THE KLAMATH SYU

SOURCE: BLM 1978

COMPARISON WITH PRESENT ALLOWABLE CUT

The present and proposed harvest levels were computed with field-generated data obtained through inventories. Empiric yield curves which show the average volume per acre by age class (Figures 1-9 and 1-10) display the results from the two inventories.

In addition to basic acreage differences, variation between the two allowable cuts is a factor of the assumptions built into the computations. In 1971 it was assumed that genetically superior planting stock would be used for reforestation. This has not proven to be the case, nor does it appear probable within the next 20 years. Therefore, wood production gains attributable to genetic stock were not included in the proposal.

No regeneration lag was assumed in computing the present allowable cut. It was thought that areas would be fully stocked with seedlings when final harvest cut of a three-stage shelterwood regime took place. Present evidence indicates that this will not occur as assumed. The proposal calls for underplanting following the regeneration cut of the two-stage shelterwood program and recognizes a regeneration period of 4 years.

It would appear that increased application of intensive management practices should offset the downward effect of increased regeneration lag. However, an insufficiency of growing stock (see Figure 1-4) makes it impossible to capture the full allowable cut effect potentially available as a result of the indicated practices.

In summary, the present allowable cut is 128 million board feet compared to a proposal for 115 million board feet, Scribner equivalent, from high intensity land. The major factor in the difference is a 21 percent smaller area allocated to high intensity timber management.

It should be reiterated that an additional 0.86 million cubic feet (5 million board feet Scribner) are contained in the proposed 10-year timber management plan. This volume, however, is not part of the allowable cut, merely trial harvest in the first decade.

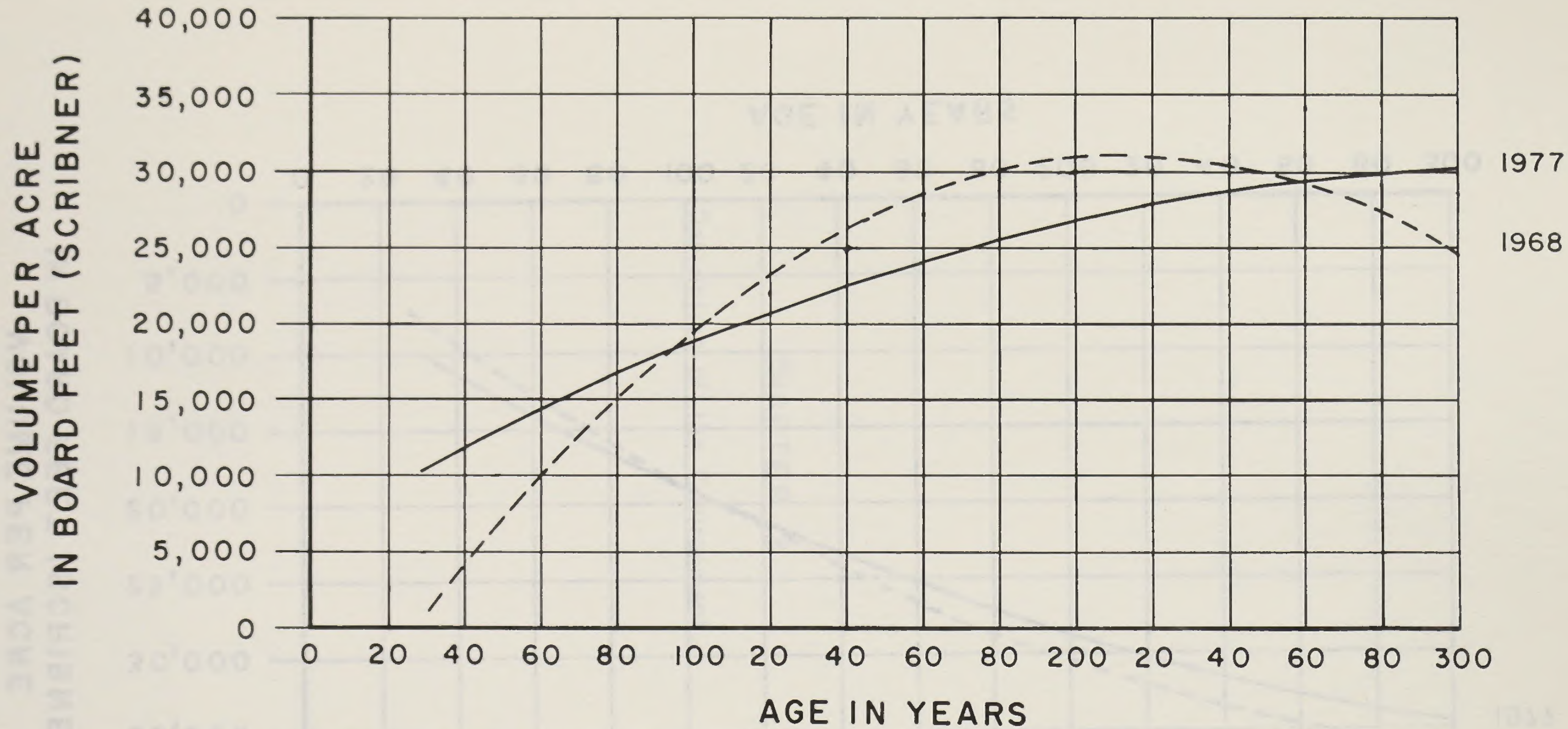


Figure 1-9 JACKSON SUSTAINED YIELD UNIT
EMPIRIC YIELD CURVES • HIGH INTENSITY LANDS
SOURCE: BLM Forest Inventory • 1968 & 1977

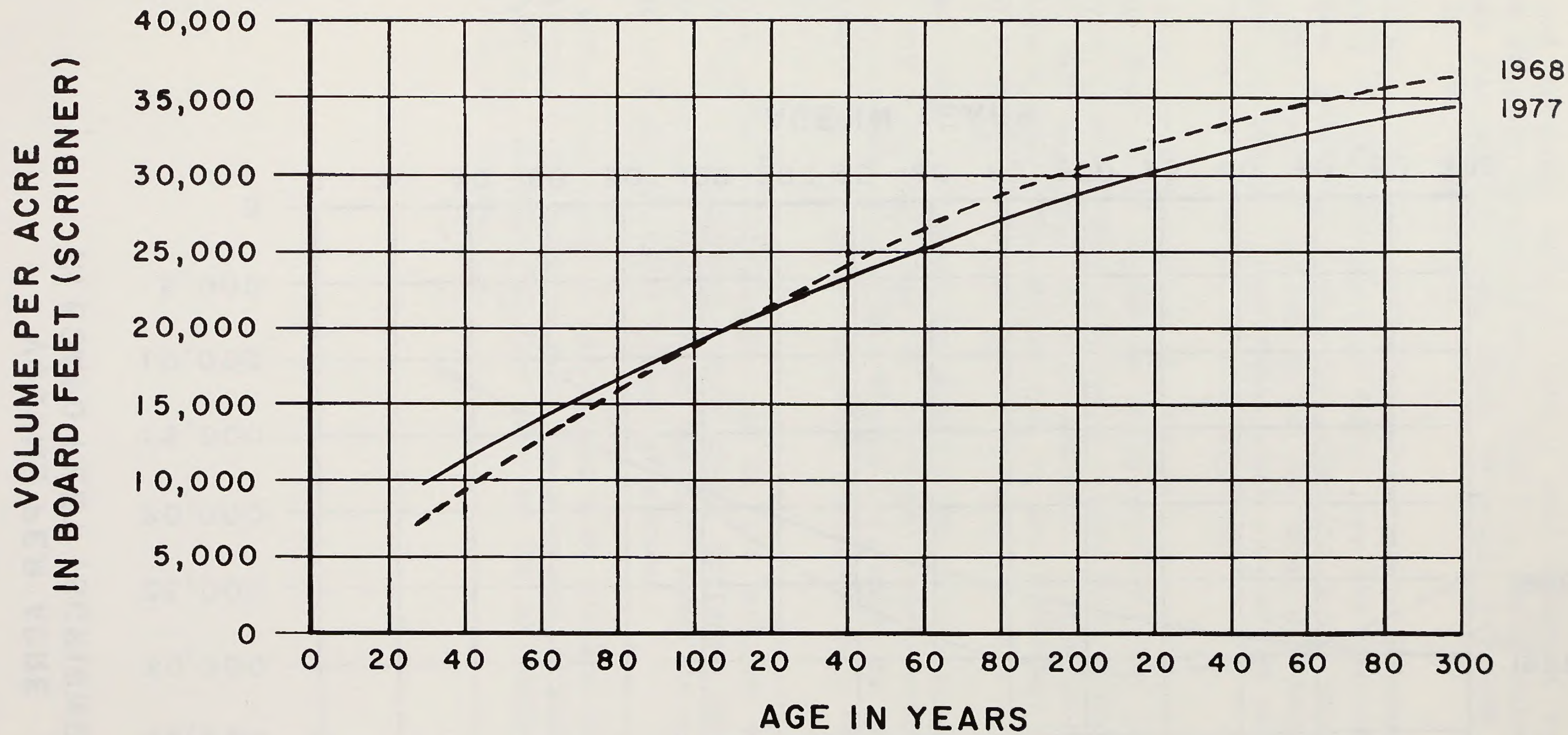


Figure 1-10

KLAMATH SUSTAINED YIELD UNIT
EMPIRIC YIELD CURVES • HIGH INTENSITY LANDS
SOURCE: BLM Forest Inventory • 1968 & 1977

CHAPTER 2

Description of the Environment

2

2. DESCRIPTION OF THE ENVIRONMENT

This chapter addresses the environment as it exists today within the Jackson and Klamath Sustained Yield Units (JKSYUs, SYUs). Since intensive timber management has been practiced within the SYUs for several decades, the environment described is seldom natural or pristine but exhibits the effects of human use.

Chapter 2 provides a basis on which impacts of the proposed action may be assessed. In preparation of this chapter those elements of the environment which might be affected were addressed. Additional background information is included only to the extent necessary to provide the basic picture.

The future environment without the proposed action is considered to be the environment that would result from continuation of the existing timber management plan for the SYU. Continuation of that plan and the environment that would result are addressed as the "no-action" alternative in Chapter 8.

In preparation of this chapter the primary data sources are documents of the Bureau planning system developed for the Jackson-Klamath Planning Area, which is comprised of the Rogue, Butte Falls and Klamath Resource Areas. The Unit Resource Analysis, Planning Area Analysis, and preliminary Management Framework Plan for Jackson-Klamath Area are available for review at Medford District Office, 310 West 6th Avenue, Medford, Oregon 97501.

Other references supplementary to or updating planning system data are cited within the body of the text by author and date of publication. A listing of these references appears in the References Cited.

2.1 CLIMATE

The climate of the Jackson and Klamath Sustained Yield Units is transitional between the Mediterranean climate to the south and the marine-mesothermal climate to the north. Winters are cool and wet, and summers are warm and fairly dry. Altitude, aspect, and wind patterns, however, may alter this general climate over a small area.

Figure 2-1 shows weather stations and mean annual precipitation throughout the planning unit. Table 2-1 gives climatic data for some of the representative stations.

Climatic conditions in the planning area do not generally create good dispersion conditions for air pollutants. Light winds (3-6 mph) prevail in Bear Creek Valley throughout the year. The height to which turbulence mixes and disperses pollutants in the airshed varies throughout the year. In the Medford area, the afternoon mixing height is usually greater than 4,000 feet from March through September and then drops to a low of 1,500 feet in December before rising again in January and February.

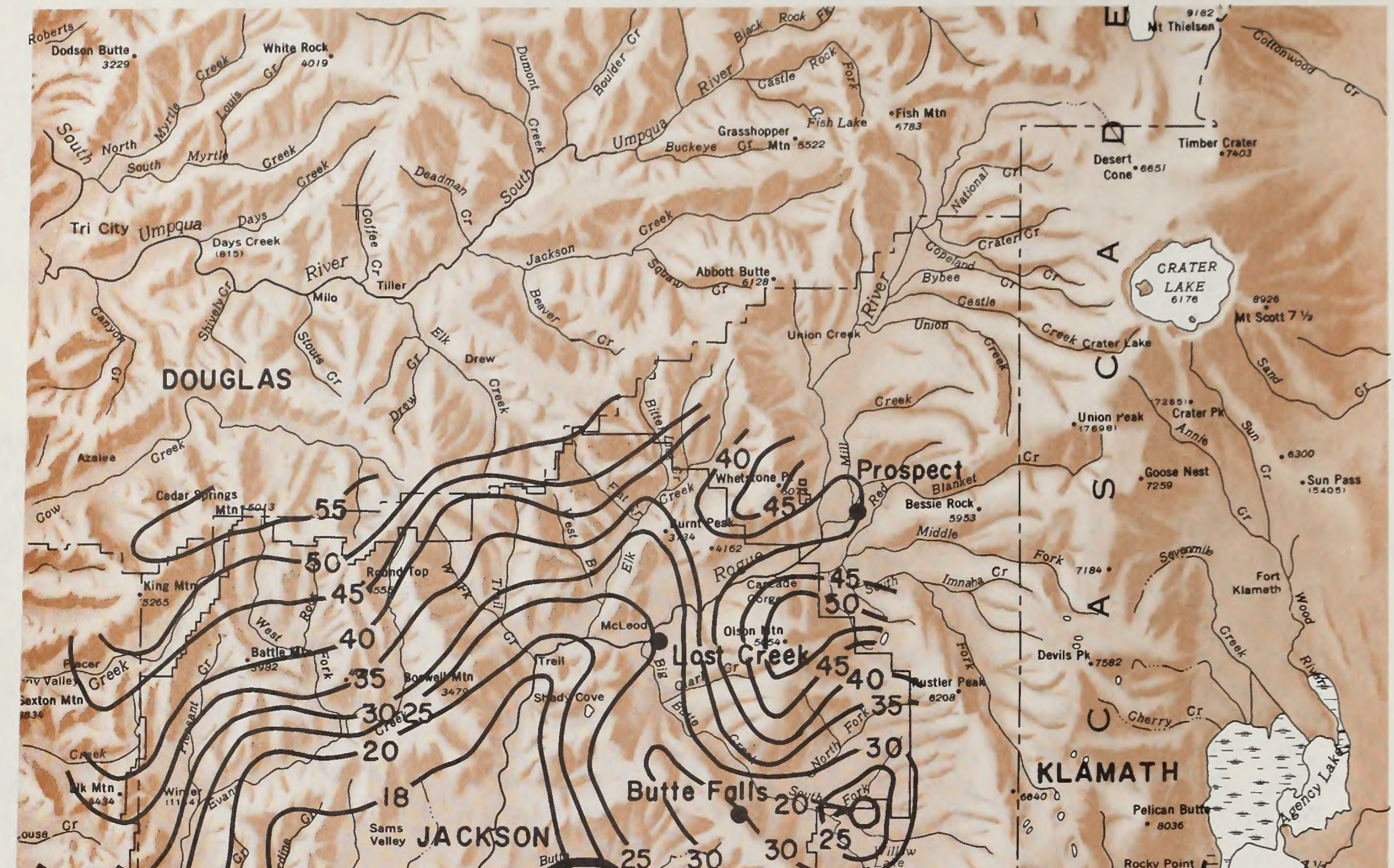


Figure 2-1 MEAN ANNUAL PRECIPITATION OF JKSYUs (IN INCHES)
SOURCE: Oregon State Water Resources Board, 1971; Pacific Northwest River Basin Commission, 1970

● Weather Stations from Jackson-Klamath URA

Table 2-1

Temperatures and Precipitation for Selected Stations in the Jackson and Klamath Sustained Yield Units

Weather Station	Elevation Feet	Temperature (°F) Average Annual	Average January	Average January Minimum	Average July	Average July Maximum	Precipitation (Inches) Average Annual	June through August
Jacksonville	1,640	53.1	36.8	30.7	71.3	87.4	24.1	2.0
Copper	1,900						33.7 1/	0.9 1/
Medford	1,312	52.6	35.4	29.8	72.0	89.2	19.8	1.4
Ashland	1,780	52.6	37.4	29.3	69.0	85.0	20.1	1.7
Howard Prairie Dam	4,567	44.2	26.9	18.6	62.2	77.4 1/	34.5	1.5
Klamath Falls	4,098	48.4	29.5	20.5	68.7	85.3	14.1	1.6
Lake Creek	1,925	52.3	37.3	28.4	68.8	88.3	29.6	2.2
Butte Falls	2,500						38.6	0.19
Lost Creek Dam	1,545	52.9	36.2		71.3		35.6	0.41
Prospect	2,482	49.8	35.4	26.2	66.2	88.0	41.7	2.4

1/ Estimated

NOTE: Averages for some readings are actually "normals" based on a 30-year record period, rather than an average for all years of record.

Source: USDI, BLM, Medford District. Jackson-Klamath Unit Resource Analysis.

2.2 AIR QUALITY

Under the Clean Air Act Amendments of 1970, Oregon has been divided into five Federal Air Quality Control Regions (AQCRs) on the basis of pollution concentrations, geography and economics. The JKSYUs lie within the Southwest Oregon AQCR and the Central Oregon AQCR (Figure 2-2).

In 1977, Crater Lake National Park (15 miles northeast of the planning area) was designated a mandatory Class I area by the Clean Air Act Amendments. Limits were set for sulfur dioxide and particulate levels in order to maintain air quality and visibility in this scenic area.

The airshed in the JKSYUs meets Federal and State Ambient Air Quality Standards, with the exception of the Bear Creek Valley. The topography and climatic conditions of this area restrict ventilation, making it one of the two areas in the continental United States most vulnerable to air pollution episodes.

In 1971-72, national air quality standards for particulates were exceeded at Medford, Grants Pass, and Ashland. By 1975, only the Bear Creek Valley exceeded the standards for particulates. This area was placed in an Air Quality Maintenance Area (AQMA). The Medford-Ashland AQMA has shown significant improvement, especially in particulate air quality, since 1970. Violations of secondary Federal standards (150 micrograms per cubic meter (ug/m^3) for a 24-hour sample) dropped from 13 in 1970 to 7 in 1975. In 1976, violations increased to 25, but this increase was due mostly to unusual weather conditions and not to increased emissions (ODEQ 1976b). With the return of more normal weather conditions in 1977, the number of particulate violations dropped to nine (ODEQ 1977). While violations are becoming less frequent, the annual geometric mean for particulates has increased, showing a worsening trend in ambient air quality. At present, primary and secondary Federal standards ($75ug/m^3$ and $60ug/m^3$) are exceeded.

Carbon monoxide standards were violated 178 times in 1977, but insufficient data are available to determine the trend. Despite generally improving air quality, the Medford-Ashland AQMA was designated a non-attainment area by the U.S. EPA in 1978 because it failed to meet ambient air quality standards for suspended particulates and carbon monoxide.

About one-half of the particulates in the JKSYUs originated from the wood processing industries, slash burning, forest fires and wigwam waste burners. The main sources of excessive hydrocarbons appear to be veneer dryers, motor vehicles, general industry and activities related to gasoline marketing (ODEQ 1976a).

2.3 GEOLOGY AND TOPOGRAPHY

The JKSYUs encompass the Klamath Mountains, Western Cascades and High Cascades geographic provinces (Figure 2-3). They are bordered by the Basin and Range province to the east.

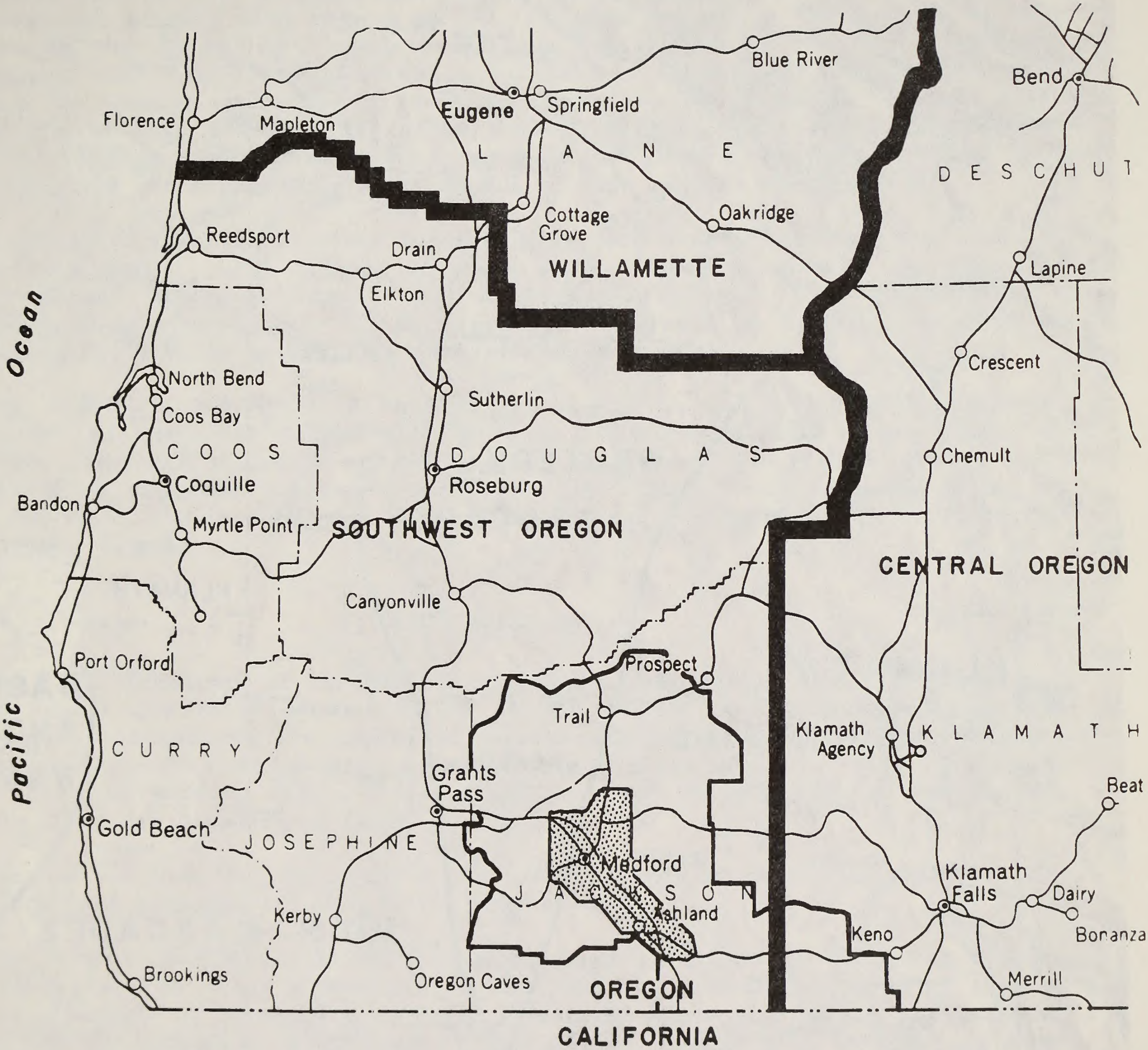


Figure 2-2 AIR QUALITY CONTROL REGIONS
SOURCE: ODEQ, 1976
Medford-Ashland Air Quality Maintenance Area

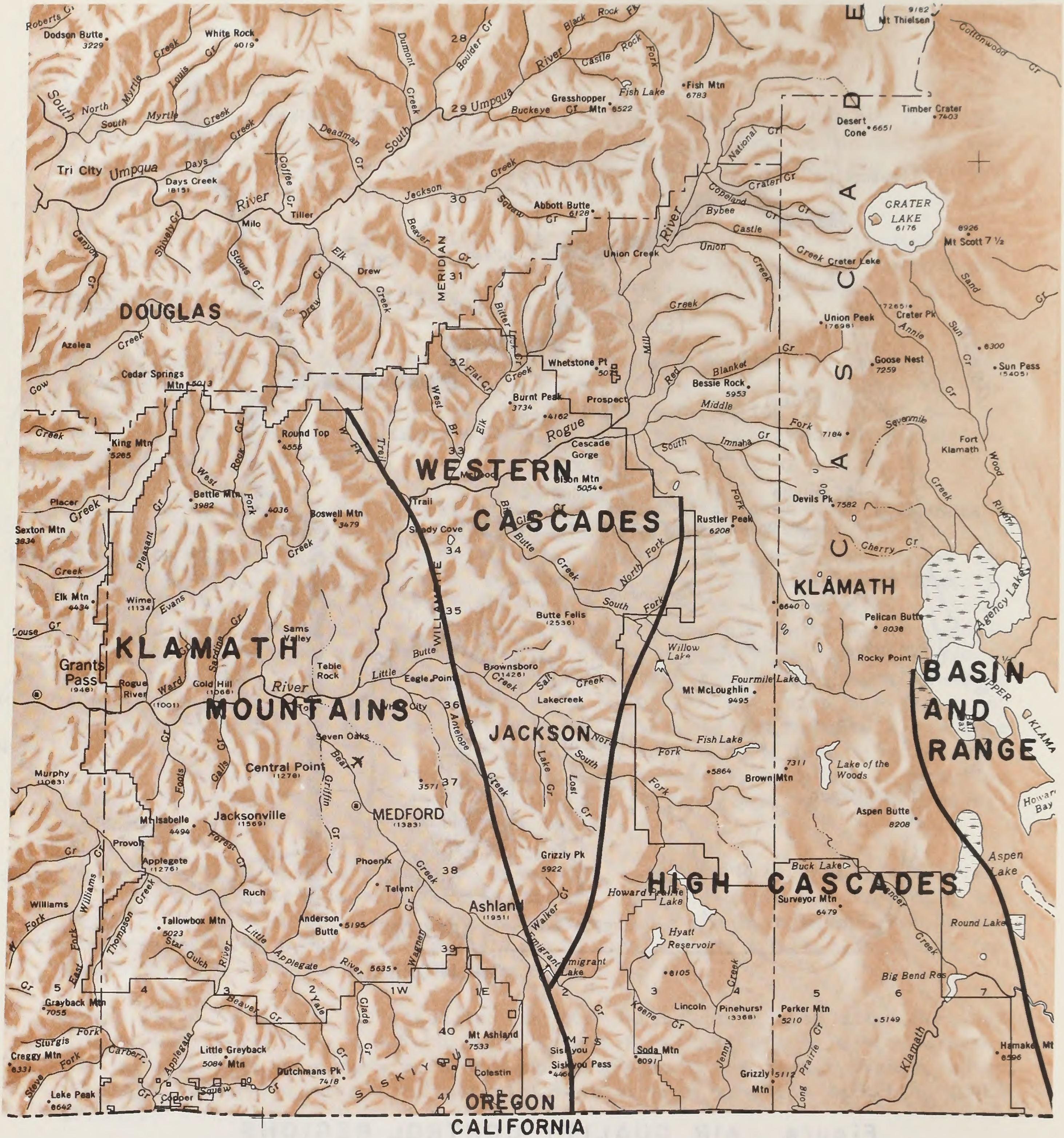


Figure 2-3 PHYSIOGRAPHIC PROVINCES
SOURCE: Franklin and Dryness, 1973

Topography in the Klamath Mountain Province consists of rugged and highly dissected terrain with steep, narrow, v-shaped valleys. The geology is very complex due to age and repeated faulting and folding of the rock. The most common rock types are sandstone, siltstone, schist and serpentine, with smaller amounts of volcanic rocks such as lava and breccias. Steep side-slopes in this province are often highly unstable, particularly where road construction and timber harvesting have occurred. Soils developed from serpentine are usually unproductive due to high amounts of magnesium.

The Western Cascades Province topography is also deeply dissected but tends to be less rugged, with rounded mountain peaks. Bedrock material is typically volcanic: andesite, basalt, and tuffs and breccias. Mass movement is a dominant erosion process in this province and results in terrain marked by basins below steep headwalls and massive rock bluffs.

The High Cascades Province consists of a narrow, gently sloping plateau of basalt and andesite capped with a chain of young volcanic peaks (USDI, GS 1969). Pockets of pumice and ash, recent lava flows, and glacial deposits are scattered over the plateau. Topography is rolling, with average relief of 1,600 feet. Soils developed from pumice and ash are unstable, particularly on steeper slopes.

2.4 SOILS

The "Soil Inventory of the Medford District" (DeMoulin et al. 1975) describes in detail the soils of the JKSYUs at the series level. Maps of the soil series associations are contained in the inventory, which may be examined at the Medford District Office or the Oregon State Office of BLM. A summary of the soil mapping units, their properties, and the acreages as described in the inventory, appears as Appendix F.

The Medford District developed a general soils map by combining soil associations that have similar properties (Figure 2-4).

The rate of erosion in the JKSYUs has been inferred from the following studies (Table 2-2) on other timberland in the Pacific Northwest because no studies are available in southwestern Oregon. Based on these studies and the weighted average of geologic formations in the JKSYUs, the overall erosion rate of undisturbed lands is estimated to be 35 tons per square mile per year.

Three types of rock found in the JKSYUs (granite, serpentine, and tuffs and breccias) have weathered to soils which have caused problems in the timber management program. Soils formed from granitic rocks have high sand and low clay content, and are highly erodable and very unstable on steep slopes. These soils include the Siskiyou (721), Holland (722), and Rogue (861) soils and are located predominantly in the Evans Creek drainage of the Klamath Mountains Province. Soils formed on serpentine have high clay content, shallow profiles, and restricted vegetation due to magnesium toxicity. Droughtiness, due to shallow profiles and high clay content, together with the magnesium toxicity severely limits timber production on serpentine soils. Small areas of the Pearsoll soil (770) are found along the western margin of

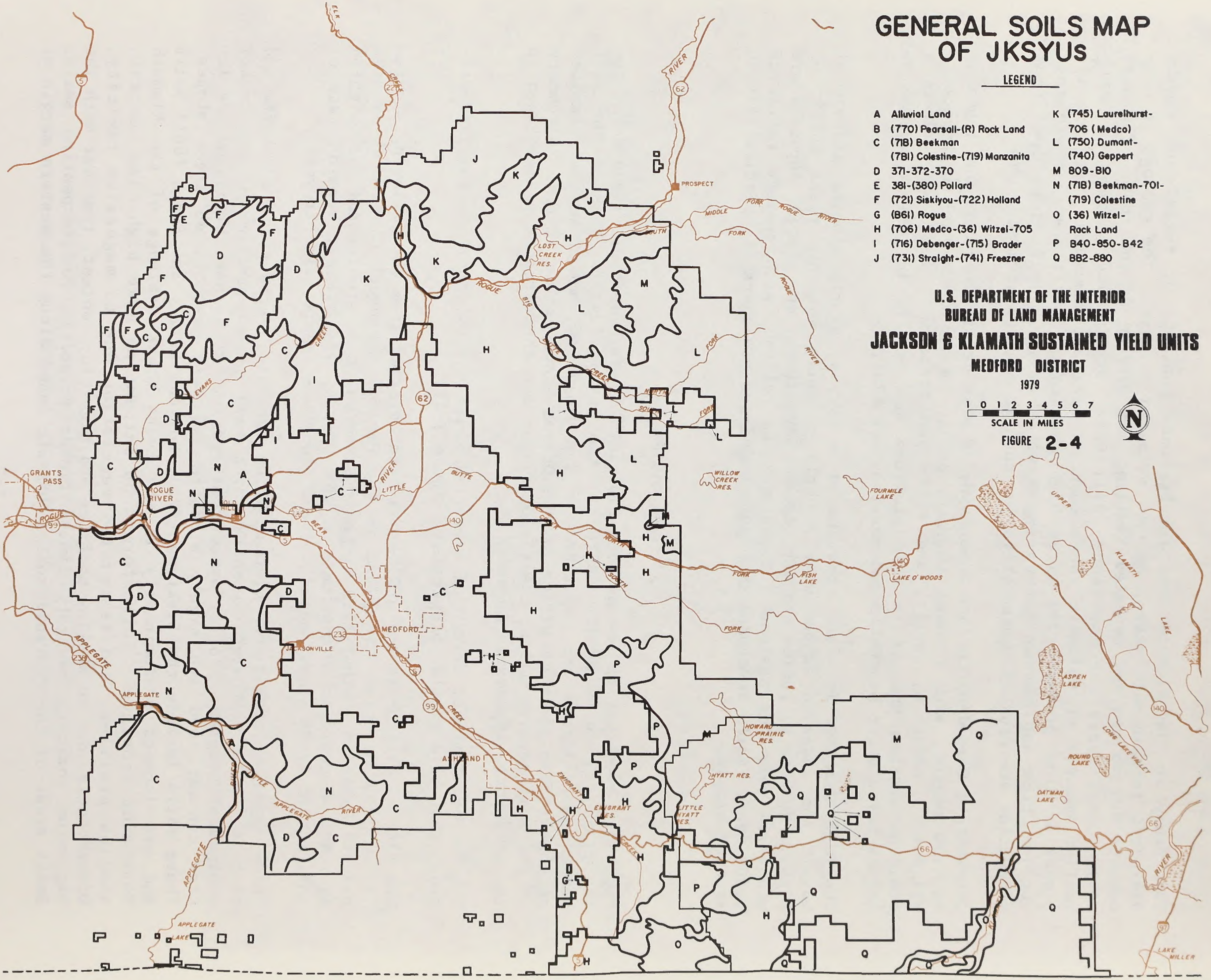

GENERAL SOILS MAP
OF JKSYUs
LEGEND
A Alluvial Land
B (770) Pearsall-(R) Rock Land
C (718) Beekman
(781) Colestine-(719) Manzanita
D 371-372-370
E 381-(380) Pollard
F (721) Siskiyou-(722) Holland
G (861) Rogue
H (706) Medco-(36) Witzel-705
I (716) Debenger-(715) Brader
J (731) Straight-(741) Freezner
K (745) Laurelhurst-
706 (Medco)
L (750) Dumont-
(740) Geppert
M 809-810
N (718) Beekman-701-
(719) Colestine
O (36) Witzel-
Rock Land
P 840-850-842
Q 882-880
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
JACKSON & KLAMATH SUSTAINED YIELD UNITS
MEDFORD DISTRICT
1979
1 0 1 2 3 4 5 6 7
SCALE IN MILES
FIGURE 2-4
N
PROSPECT
GRANTS PASS
ROGUE RIVER
MEDFORD
JACKSONVILLE
ASHLAND
APPLEGATE
LOST CREEK RES.
WILLOW CREEK RES.
FOURMILE LAKE
LAKE O' WOODS
FISH LAKE
HOWARD PRAIRIE RES.
HYATT RES.
ASPEN LAKE
ROUND LAKE
OATMAN LAKE
LAKE MILLER
APPLEGATE LAKE
EMIGRANT RES.

Table 2-2

Soil Erosion Studies

Location of Study	Parent Material	Slope (%)	Erosion Rate (tons/ sq mi/yr)	Source
H.J. Andrews Expt. Forest east of Eugene, Oregon	basalt	70%	2-19	Fredriksen, personal communication
Bull Run Watershed - east of Portland, Oregon	basalt	2-8%	4-9	Fredriksen, personal communication
Coast Range - Oregon	sandstone	20-50%	24	Rice 1977
Cascade Mtns - east of Eugene, Oregon	tuffs and breccias	55%	14	Rice 1977
Idaho	granite	30%	9	Rice 1977

the JKSYUs. The TPCC process has eliminated most of the serpentine soils from the high intensity lands of the JKSYUs (see Section 1.2.1). Soils formed from weathered tuffs and breccias which include Carney (704), 705, Medco (706), Laurelhurst (745), 840, 842, and 850 soils, are often unstable and very easily eroded. Road construction through tuffs and breccias increases the incidence of mass movement (i.e., slumps).

2.5 WATER RESOURCES

All of the Jackson and Klamath SYUs lie within either the Rogue River Watershed (80 percent) or the Klamath River Watershed (20 percent). Essentially, the Klamath SYU drains into the Klamath River and the Jackson SYU into the Rogue River system.

Within the JKSYUs, there are approximately 765 miles of Class I streams (see Glossary). Approximately 195 miles of these are on public lands.

Reservoirs within the planning area (Appendix G) have an effect on water quality and on availability of water for hydroelectric power production, irrigation, and commercial and domestic uses. Most were built primarily for irrigation purposes but have other benefits and uses, such as flood control, water quality enhancement, and recreation. Howard Prairie, Hyatt Lake, Little Hyatt Lake, Keene Creek (all in the Klamath River drainage) and Emigrant Creek Reservoirs are all interconnected by a series of canals, siphons and one small hydroelectric plant, and discharge into the Rogue River drainage.

Howard Prairie and Hyatt Reservoirs

2.5.1 Water Yield

Water movement in the forest is an important element in watershed relationships. Definitions of terms used to describe water movement may be helpful at this point. Runoff is that part of precipitation, as well as any other flow contributions, which appears in surface streams, either perennial or intermittent (Chow 1964). There are three basic components of runoff: overland flow, subsurface flow and groundwater flow. Overland flow moves over the land surface to stream channels, subsurface flow moves laterally through the upper soil horizons toward streams, and groundwater flow moves from deep water saturated zones to streams.

Subsurface flow accounts for nearly all runoff in western Oregon forests (Harr 1976a). Water not stored in the soil profile, the underlying rock, or taken up by plants either moves by subsurface flow to stream channels or percolates to groundwater.

Soils in the Jackson SYU are normally less than 40 inches deep and are underlain by rock of low porosity. Together the soil and bedrock can store only a fraction of the total precipitation, so excess water moves readily to stream channels and the resulting streamflow rises and falls with changes in seasonal rainfall. Underlying basalt in the Klamath SYU, however, is much more porous and stores water, making groundwater rather than subsurface flow the main component of streamflow in this area (Pacific Northwest River Basins

Commission 1970, pp. 856-8). Variations in streamflow in the Klamath SYU, therefore, would not be so closely linked to precipitation patterns.

Appendix G contains annual and monthly water yield data of major streams in the JKSYUs.

2.5.2 Water Quality

Present water quality generally meets with water quality standards established by Oregon Department of Environmental Quality (ODEQ) to fulfill their "nondegradation" policy (ODEQ 1976 c,d). Appendix G contains water quality descriptions and a summary of water quality at various sampling sites on the Rogue, Klamath and Applegate Rivers and at selected reservoirs.

Present non-point source pollution problems in the JKSYUs include those of elevated water temperatures, nuisance algae and aquatic plant growth, excessive debris, sedimentation, streambank erosion, and water withdrawals causing stream-quality problems (ODEQ 1978). A composite map of these problems was made and showed that Evans Creek, South Fork Little Butte Creek, the Applegate River and Bear Creek had major non-point source pollution problems. The nature of these problems is shown in Table 2-3.

2.6 FIRE

In the 12 years from 1966 to 1977, the number of fires occurring annually on BLM-administered lands in the JKSYUs has ranged from 15 to 39, with an average of 30 fires per year. Acreage burned annually varied from 5 to 976 acres, with an average of 231 acres. Although 69 percent of the fires were caused by lightning, fires caused by people accounted for 96 percent of the acres burned (BLM Fire Report Files, OSO).

The fire season in the SYUs generally begins in May and often lasts until mid-October. The high temperatures, low humidity and numerous isolated thunderstorms common this time of year are conducive to forest fires. It is also the major recreation season.

2.7 VEGETATION

Vegetation within the JKSYUs combines elements of the California, north coast and eastern Oregon floras. The planning area contains specimens of many plants which are growing on the edge of their natural range or are unique to the region. The eastern Siskiyou Mountains are especially rich in endemic and relict species (Waring 1969).

For purposes of this ES, vegetation is generally described in terms of "zones" adapted from those identified by Franklin and Dyrness in their Natural Vegetation of Oregon and Washington (1973). Unless otherwise noted, all vegetation

Table 2-3

Non-Point Source Pollution Problems

Problem	Evans Creek	South Fork Little Butte Creek	Bear Creek	Applegate River
Elevated water temperature	Severe	Severe	Severe	Severe (portions)
Nuisance algae and aquatic plant growth	--	Moderate	Severe	Moderate
Water-withdrawal-related problems	Severe	Severe	Severe	Severe
Sedimentation	Severe	Severe	Severe	Severe
Excessive debris	--	Severe	--	--
Streambank erosion	Severe	Severe	Severe[1/]	Severe[1/]

[1/] Smaller tributaries

Note: Severe: a problem where there is substantial or nearly complete interference with recreational opportunities or other desired uses of the water--where physical or chemical character of the stream, lake or reservoir has been severely changed, resulting in a substantial alteration of fish or invertebrate populations.

Moderate: a problem which interferes with the desired uses of the water body or interferes with the normal life history or composition of aquatic populations.

Source: ODEQ 1978

data are drawn from that source or from data prepared in the Medford District. Common names are used where possible for all plants discussed in this section. In some cases, such as several of the endangered plants, no common names exist, and therefore scientific names were used in the text. A complete list of common and scientific names for all plants discussed is available upon request.

Major vegetation zones within the planning area are the Interior Valleys Zone, the Mixed Conifers Zone and the White Fir Zone.

2.7.1 Interior Valleys Zone

This zone consists of the lowlands and valley bottoms enclosed by the Siskiyou (Klamath) Mountains. Plant communities include grasslands, oak woodlands, evergreen shrub lands (sometimes called chaparral) and scattered conifer forests. The occurrence of these communities is dependent upon temperature, moisture and soil factors. Each of these plant communities is described in the sections which follow.

2.7.1.1 Grasslands

Grassland communities generally occur on the low elevation foothills and steep, south facing slopes. The dominant grass is Idaho fescue. Bluebunch wheatgrass, prairie junegrass and pine bluegrass are common. Alaska oniongrass and mountain brome are frequently found on more moist sites in the foothills. Other commonly occurring grasses include blue wildrye, western fescue, California fescue, California oatgrass and Canada bluegrass. A wide variety of forbs are present including Collomia spp., Brodiaea spp., bedstraw, Lomatium spp., dusty pink, western yarrow, coyote mint and common woolly sunflower (Hickman 1976).

2.7.1.2 Oak Woodlands

The Interior Valleys Zone is characterized by forest stands, groves and savannas dominated by the deciduous Oregon white oak, California black oak and the evergreen Pacific madrone. Typical shrubby species, though occurring infrequently, include Pacific poison oak, California honeysuckle, white-leaved manzanita and birchleaf mountain mahogany (Hickman 1976). The grasses and forbs growing beneath the oaks are similar to those found in the open grasslands. On more moist sites and northeast slopes, Douglas-fir, ponderosa pine and incense-cedar penetrate the oak canopy. On drier sites, the oak canopy decreases and annual grasses and forbs increase. South and southwest slopes are commonly grasslands with only a few scattered oaks or none at all.

2.7.1.3 Evergreen Shrublands (Chaparral)

Numerous evergreen shrub communities occur within the Interior Valleys Zone. Some of these chaparral communities are climax, whereas others are maintained by recurring fires. Predominant species include deerbrush, Pacific poison oak, skunkbrush sumac, white-leaved manzanita, hoary manzanita, curl-leaf mountain mahogany, pale serviceberry and whitestem gray rabbitbrush. The understory is dominated by Idaho fescue. A variety of forbs such as *Brodiaea* spp., bedstraw and *Collomia* spp. are also present (Hickman 1976).

2.7.1.4 Conifer Forests

The composition of coniferous stands in the interior valleys of the planning area include Douglas-fir, ponderosa pine, sugar pine and incense-cedar.

Waring (1969) recognized a ponderosa pine type that occurs in those portions of the planning area which are within the eastern Siskiyou Mountains. Steep slopes of south or southwestern exposure support a xeric ponderosa pine type with Douglas-fir, Pacific madrone, and sometimes white fir growing in association with ponderosa pine. Typical understory species include white-leaved manzanita, green manzanita, pine-mat manzanita, western yarrow, Canada goldenrod, low dogbane and various species of lupine.

2.7.2 Mixed Conifers Zone

The Mixed Conifers Zone occupies mid-elevations in the southwestern Oregon Cascade Range and eastern Siskiyou Mountains (Waring 1969). It is bounded by the Interior Valleys Zone at its lower limit and by the White Fir Zone at its upper limit.

Major tree species in this zone are Douglas-fir, sugar pine, ponderosa pine, incense-cedar and white fir, with Douglas-fir the most abundant. The white fir, as discussed here, is part of the grand fir-white fir species complex common in southwestern Oregon. Some populations of trees resemble grand fir while others resemble white fir. In this statement both species are referred to as white fir.

Sugar pine and ponderosa pine usually occur as scattered individuals. The proportion of incense-cedar is greatest on the drier sites. White fir is often present mainly as seedlings and saplings in existing mixed-conifer stands. Other typical tree species include bigleaf maple, golden chinkapin and Pacific madrone. Characteristic understory species include California hazel, creambush oceanspray, creeping snowberry, trailing blackberry and baldhip rose.

2.7.3 White Fir Zone

This zone occupies a relatively narrow elevational band, occurring at about 4,600 to 5,200 feet in the Cascade Range and 5,400 to 5,900 feet in the eastern Siskiyou Mountains.

White fir is the major tree species within this zone, often forming pure or nearly pure stands. The most common associate is Douglas-fir. Sugar pine, ponderosa pine and western white pine may also be present in small numbers. Incense-cedar is often found on moderately moist sites. Shasta red fir is increasingly common toward the upper limit of the zone. Lodgepole pine is encountered as a pioneer species in the Cascade Range.

Characteristic understory species include creambush oceanspray, baldhip rose, Oregon grape, California hazel, Rocky Mountain maple, trailing blackberry, snow dewberry, Saskatoon serviceberry and golden chinkapin.

2.7.4 Other Significant Vegetation Areas

2.7.4.1 Ponderosa Pine Zone

Ponderosa pine forests occupy a narrow band along the breaks of the Klamath River. At their upper limits these forests grade into the White Fir Zone. To the east of the Chicken Hills and south of Soda Mountain they abut a white oak/wedge leaf association with scattered juniper.

Specific habitat within this zone support western juniper, quaking aspen, lodgepole pine and Oregon white oak. Commonly found shrubs include deerbrush, narrow-leaved buckbrush and bitterbrush. Perennial grasses include bluebunch wheatgrass, blue wildrye, Idaho fescue, prairie junegrass, various bluegrasses, bottlebrush squirrel-tail and Columbia needlegrass. The most common annual grasses are cheatgrass brome, medusa-head wildrye, ripgut brome and California brome.

2.7.4.2 Serpentine Soils

Serpentine areas in this discussion are habitats with soils low in calcium and high in magnesium, chromium, and nickel. They are characterized by unusual plant communities, and vegetation is invariably stunted in comparison with that on adjacent nonserpentine soils.

The outstanding feature of serpentine sites is the Jeffrey pine/grass/woodland which occupies the driest serpentine sites between 1,000 and 6,500 feet in elevation. Jeffrey pine is typically the only tree species present, along with a sparse growth of grasses (e.g., lemon needle grass, big squirrel-tail, Geyer oniongrass, blue wildrye and sheep fescue) and an occasional white-leaved manzanita.

Serpentine areas intermediate in elevation and moisture are typified by a sparse, dry appearance and are dominated by a mixture of Douglas-fir, incense-cedar, Jeffrey pine, western white pine, sugar pine and knobcone pine. Associated with these trees is evergreen brush including huckleberry oak, tanoak, red huckleberry, box-leaved garrya and Oregon myrtle.

A community type consisting of Port-Orford-Cedar/western white pine/Douglas-fir with a dense, shrubby understory occupies serpentine areas in ravines and draws. Higher elevation serpentine areas may support forests dominated by white fir, Douglas-fir and western white pine. Common beargrass and pine-mat manzanita dominate the understory.

Common serpentine indicator plants include Jeffrey pine, podfern, dwarf ceanothus, common woolly sun-flower and small-flowered willowweed.

2.7.4.3 Streamside (Riparian) Vegetation

Oregon ash is a very characteristic species of streamside habitats in the interior valleys as well as in the adjacent, higher elevation forest zones within the planning area. Bigleaf maple also commonly occurs. Understories may be composed of herbaceous types, particularly sedges or dense shrubs.

2.7.4.4 Aquatic Vegetation

The predominant aquatic plant habitats on BLM lands within the JKSYUs include reservoirs, streams, rivers, seeps and springs.

In streams and other moving waters two major habitat zones are generally evident: the rapids zone and the pool zone. The rapids zone is usually shallow water where the speed of the current is great enough to keep the bottom clear of silt and other loose materials, thus providing a firm bottom. This zone is occupied largely by specialized rooted or clinging plants.

The pool zone is generally deeper water with a reduced current; silt and other loose materials tend to settle here, providing a soft bottom. Rooted plants are not generally found in the deeper pools, but do grow around the edges in areas of shallow water.

In small streams, plankton originates in ponds or backwaters connected with streams and is carried downstream, being reduced as it passes through rapids. Only in slow-moving portions of streams and in the larger Klamath, Applegate and Rogue Rivers is plankton able to grow and multiply.

Permanently attached plants often found in streams and rivers include algae, encrusting diatoms and mosses.

Seeps and springs are numerous and widespread in the JKSYUs. The plant communities associated with seeps and springs seem to be in a steady state

with little change occurring over time. Spring and seep communities are characterized by cattails, sedges, seeds, rushes and cresses.

2.7.5 Rare, Threatened and Endangered Plants

As provided by the Endangered Species Act of 1973, the U.S. Fish and Wildlife Service published in the Federal Register (40 FR 127:27828-27924, 1975; 41 FR 117: 24524-24572, 1976) lists of more than 1,700 species of vascular plants proposed for endangered or threatened status.

Endangered plants are those species that are in danger of extinction throughout all or a significant portion of their range. Threatened plant species are those that presently are not endangered but are likely to become so within the forseeable future throughout all or a significant portion of their range.

Botanical surveys for endangered, threatened and rare plants were conducted on the Medford District in 1978. As a result of this survey, six proposed endangered or threatened plants are listed as having been observed on BLM lands within the JKSYUs. These plants species are shown on Table 2-4.

A State Provisional List of Rare, Threatened and Endangered Plants in Oregon has been complied by members of the Oregon Rare and Endangered Plant Species Task Force. This list contains all the species which have been proposed for endangered or threatened status plus many additional species on which the Task Force is gathering information to help determine the present status of these species.

Some 20 species of plants included on the State Provisional List have been observed on BLM land in the JKSYUs and are listed in Table 2-5.

2.8 ANIMALS

2.8.1 Terrestrial Vertebrates

Animal distribution, diversity and abundance are dependent on various factors; of primary importance is vegetation. Each vegetational zone described in Section 2.7 contains a variety of plant communities which may be in different successional or seral stages. It is these differences in communities and successional stages that account for the variety of animals found in the planning area.

It should not be inferred that each animal species is found only in one particular successional stage of a given community or zone, as community structure and physical environmental features may be similar enough between zones to allow considerable species overlap, especially in animal populations with wide habitat tolerances. However, in some cases a very close relationship to a particular stage or zone does exist.

Table 2-4

Proposed Endangered or Threatened Plant Species Observed in the JKSYUs

Species	Status[1]
Arabis oregana	T
Calochortus greenei	E
Cypripedium fasciculatum	E
Limnanthes floccosa ssp. pumila	E
Microseris laciniata ssp. detlingii	T
Phacelia peckii	T

[1] Status: T = Threatened; E = Endangered

Source: A Botanical Field Inventory, BLM - Medford, District, 1978.

Table 2-5

Plant Species on the State Provisional List Observed in the JKSYUs

Allium amplectens	Hemitomes congestum
Allium siskiyouense	Horkelia daucifolia
Arabis breweri	Isoetes nuttallii
Calypso bulbosa	Mimulus douglasii
Crepis bakerii ssp. cusickii	Orthocarpus cuspidatus
Cypripedium montanum	Pedicularis densiflora
Eburophton austinae	Pellaea brachyptera
Erythronium hendersonii	Ribes klamathense
Erythronium blamathense	Trillium albidum
Fritillaria recurva	Viola douglasii

Source: A Botanical Field Inventory, BLM - Medford District, 1978.

Successional stages are dynamic. They are always progressing toward their climax form and during this progression their faunal components are also changing. A climax white fir forest, for instance, supports a very different animal association than it did in its early successional stage several hundred years before. Progress toward climax can be curtailed at any point by outside influences, either natural or artificial. For instance, fire or logging may set back succession, and those animal species associated with the current stage will be replaced with those adapted to exist in the early successional stages.

Modifying or removing one particular stage, e.g. old growth, has a profound effect on those individuals and species occurring there. It is recognized that these effects do not stop with just those species, as the ecosystem as a whole is altered by the modification of one of its parts. Certain results may be harmful to some species and beneficial to others, but all are affected.

There are 40 species of amphibians and reptiles, 217 species of birds, and 81 species of mammals that occur or probably occur in the planning area. A complete list is available on request from the Oregon State Office.

A list of terrestrial vertebrates that seemed most likely to be affected either positively or negatively by the proposed action was developed. The list was limited to those species normally associated with the forest types that would be harvested. One result of this limitation was the exclusion of those species found in the planning area but not in the forest type that would be harvested; e.g., agricultural or chaparral lands. The list was prepared from many published sources (Browning 1975; Burt and Grossenheider 1964; Gabrielson and Jewett 1940; Ingles 1965; Maser et al. (in press); Meslow 1977; Peterson 1961; Robbins et al. 1966) as well as from BLM documents.

To further reduce the number of species to those which were judged significant, seven criteria were established. These criteria of significance are:

Threatened, endangered or of special status.
Dependence on mature or old-growth timber for part of their life cycle.
Dependence on early seral stages for part of their life cycle.
Limited geographical range.
Recreation or commercial importance.
Limited adaptability.
Important prey species of the spotted owl.

Selections of species of limited adaptability were based on the work of Thomas et al. (1977), who established a vulnerability index based on the number of successional stages and plant communities used for feeding and reproduction. The fewer stages and communities used, the lower the index number. Those species with a low index number have narrower habitat requirements than those species with a higher number and are more vulnerable to habitat modification.

All known terrestrial vertebrate species inhabiting commercial timber lands were tested against the seven criteria. Those meeting one or more of these criteria appear in Table 2-6. The use of seral stages was adapted from Thomas

Table 2-6

Selected Terrestrial Vertebrates of
the Jackson and Klamath SYUs

SPECIES	Vegetation Zone	Resident	Seral Stage: Grass/Forb	Seral Stage: Brush/Seedling	Seral Stage: Pole/Sapling	Seral Stage: Young 2nd Growth	Seral Stage: Mature	Seral Stage: Old Growth	Criteria of Significance	Population Status	Relative Abundance	Habitat Quality	Habitat Quantity
1. Siskiyou Mountain salamander *Plethodon stormi*	C	P	?	?	?	?	?	OX	1/4	?	?	?	?
2. Great blue heron *Ardea herodias*	A	P	0					X	6	⊥	C	G	S
3. Goshawk *Accipiter gentilis*	FC	P		0		0	OX	OX	2	⊥	U	G	⊥
4. Bald eagle *Haliaeetus leucocephalus*	FC	P	0	0			OX	OX	1	⊥	U	F	⊥
5. Osprey *Pandion haliaetus*	FC	P					X	X	6	S	U	G	S
6. Blue grouse *Dendragapus obscurus*	FC	P	0	OX	OX	0	0	0	5	⊤	C	G	S
7. Ruffed grouse *Bonasa umbellus*	CV	P		OX	X	0	OX	OX	5	S	C	F	S
8. Mountain quail *Oreortyx pictus*	CV	P	0	OX	OX	OX	0	0	5	⊤	C	G	⊥
9. Band-tailed pigeon *Columba fasciata*	CV	B	0	0	0	0	OX	OX	5	⊤	C	G	⊤
10.*Spotted owl *Strix occidentalis*	FC	P				0	OX	OX	1/2	⊥	U	G	⊥
11. Great gray owl *Strix nebulosa*	FC	P	0			OX	0	0	6	S	U	G	⊥
12.*Saw-whet owl *Aegolius acadius*	FC	P				X	OX	OX	2	S	U	F	S
13.*Vaux's swift *Chaetura vauxi*	FC	B					OX	OX	2	S	C	F	⊥
14. Calliope hummingbird *Stellula calliope*	FC	B	0	OX	OX	0	0	0	3	S	C	G	S
15.*Pileated woodpecker *Dryocopus pileatus*	FC	P					OX	OX	2/6	⊥	U	F	⊥
16.*Yellow-bellied sapsucker *Shyrapicus varius*	A	P				OX	OX	OX	2/6	⊥	C	F	⊥
17.*Williamson's sapsucker *Sphyrapicus thyroideus*	FC	P					OX	OX	2/6	⊥	U	F	⊥
18.*White-headed woodpecker *Picoides albolarvatus*	FC	P					OX	OX	2/6	⊥	U	F	⊥
19.*Black-backed three-toed woodpecker *Picoides arcticus*	FC	P				OX	OX	OX	2/6	⊥	U	F	⊥
20.*Northern three-toed woodpecker *Picoides tridactylus*	F	P				OX	OX	OX	2/6	⊥	U	F	⊥
21.*Tree swallow *Iridoprocne bicolor*	A	B	0	0		X	X	OX	6	S	C	F	⊥
22. Clarks nutcracker *Nucifraga columbiana*	F	P				0	OX	OX	6	S	U	F	⊥
23.*White-breasted nuthatch *Sitta carolinensis*	CV	P					OX	OX	2/6	S	C	F	S
24.*Red-breasted nuthatch *Sitta canadensis*	F	P				OX	OX	OX	2/6	S	C	F	⊥
25.*Pygmy nuthatch *Sitta pygmaea*	C	P					OX	OX	2/6	S	U	F	⊥
26.*Brown creeper *Certhia familiaris*	A	P				0	OX	OX	2/6	S	C	F	⊥
27. Cedar waxwing *Bambycilla cedrorum*	A	P		OX	OX	OX	OX		6	S	C	P	S
28. Nashville warbler *Vermivora ruficapilla*	C	B		OX	0	0			3/6	S	C	G	S

Table 2-6 (Continued)

Selected Terrestrial Vertebrates of the Jackson and Klamath SYUs

SPECIES	Vegetation Zone	Resident	Seral Stage: Grass/Forb	Seral Stage: Brush/Seedling	Seral Stage: Pole/Sapling	Seral Stage: Young 2nd Growth	Seral Stage: Mature	Seral Stage: Old Growth	Criteria of Significance	Population Status	Relative Abundance	Habitat Quality	Habitat Quantity
29. Red crossbill Loxia curvirostra	A	P				O	OX	OX	2	⊥	U	G	⊥
30. Savannah sparrow Passerculus sandwichensis	CV	P	OX	O					3/6	⊤	C	G	⊤
31. Vesper sparrow Pooecetes gramineus	CV	B	OX						3/6	⊤	C	F	⊤
32.*Big brown bat Eptesicus fuscus	C	P	O	O	O	O	OX	OX	2	S	C	G	S
33. Least chipmunk Eutamias minimus	FC	P	OX	OX					3/6	S	U	G	S
34.*Western gray squirrel Sciurus griseus	CV	P			OX	OX	OX	OX	5	⊤	C	P	⊤
35. Northern flying squirrel Glaucomys sabrinus	FC	P					OX	OX	2/7	⊥	U	F	⊥
36. Red tree vole Plenacomys longicaudus	C	P				OX	OX	OX	7	S	C	G	⊤
37. Black bear Ursus americanus	A	P	O	OX	OX	OX	OX	OX	5	S	C	G	S
38.*Marten Martes americana	FC	P			O	O	OX	OX	2/6	⊥	U	P	⊥
39. River Otter Lutra canadensis	FC	P	OX	OX	OX	OX	OX	OX	1/5	⊤	U	F	S
40. Mountain lion Felis concolor	FC	P	O	OX	OX	OX	OX	OX	5	⊤	U	P	⊥
41. Bobcat Felis rufus	A	P		OX	OX	OX	OX	OX	1/5	⊥	U	G	S
42. Feral horse Equus cabalus	C	P	OX	OX	X		O	O	4	⊥	U	F	S
43. Roosevelt elk Cervus elaphus roosevelti	A	P	O	OX	OX	O	O	O	5	⊤	U	G	⊥
44. Mule deer Odoceileus hemionus hemionus	FC	P	O	OX	OX	O	O	O	5	⊥	C	F	⊥
45. Black-tailed deer Odoceileus hemionus columbianus	A	P	O	OX	OX	O	O	O	5	⊥	A	G	⊥

KEY

* = Cavity User
? = Unknown

Primary Vegetation Zone

F = White fir
C = Mixed conifer
V = Interior valley
A = All

Resident

P = Permanent
B = Breeding

Seral Stage

O = Feeding
X = Breeding

Population Status

⊤ = Increase
S = Stable
⊥ = Decrease

Relative Abundance

A = Abundant
C = Common
U = Uncommon

Habitat Quality

P = Poor
F = Fair
G = Good
E = Excellent

Criteria of Significance

1 = Threatened, endangered or special status
2 = Mature or old growth dependent
3 = Early seral stage dependent
4 = Species of limited range
5 = Recreational or commercial value
6 = Species of small adaptability indeces
7 = Important prey species of spotted owl

Habitat Quantity

⊤ = Increase
S = Stable
⊥ = Decrease

et al. (1977) and Meslow (1977). Information displayed in other columns may be based on subjective judgments made by persons knowledgeable with the SYUs.

In summary, the information presented in Table 2-6 lists selected species of the commercial forest lands of the Jackson and Klamath SYUs, some aspects of their life history, and what is known of the status of their population and habitat. Figure 2-5 displays other pertinent information such as location of deer and elk winter range, and spotted owl locations.

2.8.2 Fish

Two major river systems, the Rogue and the Klamath, drain the planning area. Neither the headwaters nor the terminus of either river are within the SYUs.

The fisheries resources of the two systems are somewhat different due to dam construction on the Klamath downstream of the planning area. These dams, the oldest of which was built in 1917, have blocked passage of anadromous fish and eliminated them from previously occupied habitat. In other respects the fisheries are similar and will be discussed together unless otherwise indicated.

The aquatic habitats of the planning area include not only the major drainage systems mentioned, but also a number of lakes, reservoirs and small self-contained ponds. These systems support a variety of species of both game and non-game fish. A complete list of species known to occur in the planning area is available on request from the Oregon State Office.

2.8.2.1 Cold Water Game Fish

Anadromous Game Fish. The anadromous game fish are the most economically important species in the planning area. They are not only a highly prized and much sought-after game fish, but some species (salmon) are an important commercial fish. Anadromous game fish of the SYUs are chinook salmon, coho salmon, steelhead and sea-run cutthroat.

These fish are hatched and reared in fresh water, go to the sea to mature, and return to their home streams to spawn and, in the case of the salmon, to die. The length of this cycle is species specific. Location of important anadromous fish spawning areas is illustrated in Figure 2-6.

Populations of all of these fish are much reduced from historic highs and, in the Klamath drainage, eliminated almost entirely within the boundaries of the SYUs. Man's influence has been responsible for these reductions, primarily through dam building, water withdrawal, fishing, and habitat destruction and degradation. In recent years attempts have been made to rectify this situation by supplementing wild stocks with hatchery-reared fish, and by habitat protection and improvement activities.

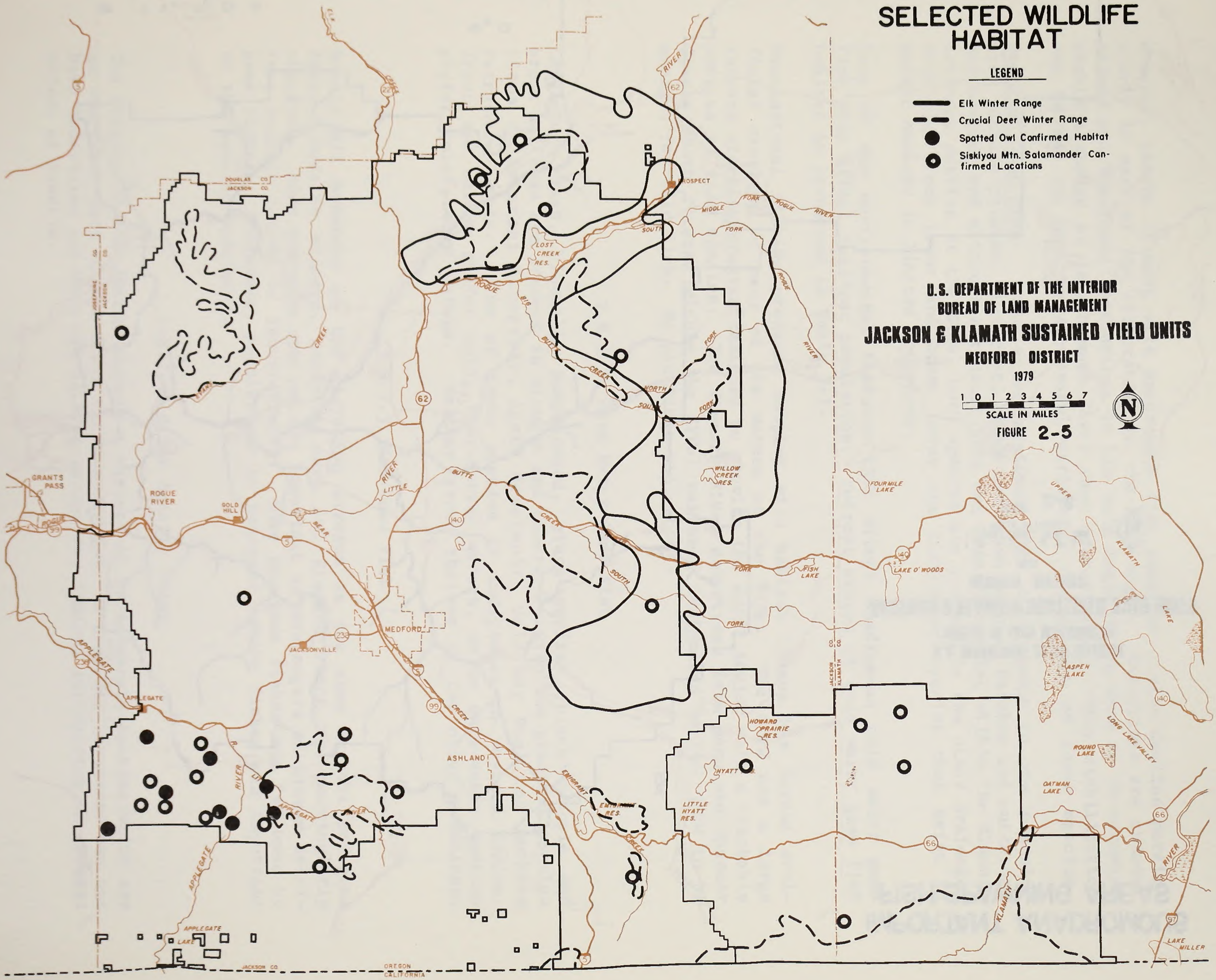

SELECTED WILDLIFE HABITAT
LEGEND
Elk Winter Range
Crucial Deer Winter Range
Spotted Owl Confirmed Habitat
Siskiyou Mtn. Salamander Confirmed Locations
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
JACKSON & KLAMATH SUSTAINED YIELD UNITS
MEDFORD DISTRICT
1979
1 0 1 2 3 4 5 6 7
SCALE IN MILES
N
PROSPECT
MIDDLE FORK ROGUE RIVER
LOST CREEK RES.
WILLOW CREEK RES.
FOURMILE LAKE
UPPER KLAMATH LAKE
LAKE O' WOODS
FISH LAKE
ASPEN LAKE
HOWARD PRAIRIE RES.
HYATT
LITTLE HYATT RES.
ROUND LAKE
LONG LAKE VALLEY
OATMAN LAKE
EMIGRANT RES.
ASHLAND
MEDFORD
JACKSONVILLE
GOLD HILL
ROGUE RIVER
GRANTS PASS
APPLEGATE
APPLEGATE LAKE
LAKE MILLER
DOUGLAS CO.
JACKSON CO.
JOSEPHINE CO.
KLAMATH
OREGON
CALIFORNIA

FIGURE 2-5

IMPORTANT ANADROMOUS FISH SPAWNING AREAS

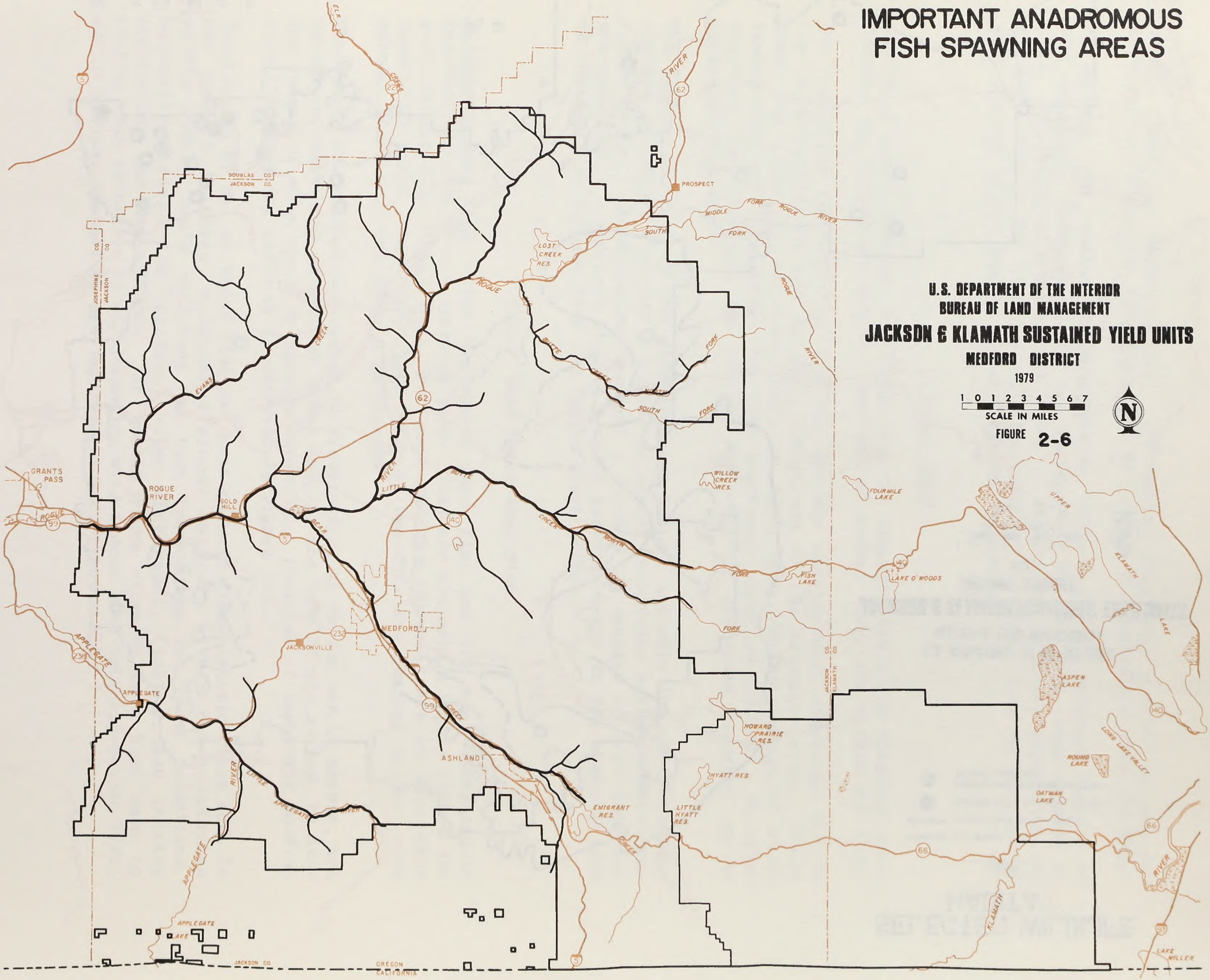


FIGURE 2-6

However, stocks of most wild anadromous fish continue a slow decline particularly in many of the tributaries to the main Rogue. Exceptions are chinook salmon and steelhead populations in the main Rogue which seem to be somewhat stable although at levels much lower than historically. This stabilization may be due in part to successful artificial propagation of these species.

Resident Game Fish. Cold water resident game fish found in the planning area include rainbow, cutthroat, brook and brown trout. Rainbow and cutthroat are native; and although cutthroat have not been identified within the Klamath drainage portion of the SYUs, both species are present in the other drainage. Both the brook trout and brown trout are introduced species that exist in modest numbers in limited locations.

Many of the environmental features that affect anadromous cold water game fish also affect resident population. Current status of cold water game fish habitat is presented in Table 2-7.

Recreational fishing pressure coupled with habitat losses has forced artificial stocking of many of the waters of the SYUs. The ODFW has a large rainbow stocking program designed to provide the sport angler with a catchable surplus of this species. The Klamath River downstream from Keno and Spencer Creeks (both located within the SYUs) has been designated by the ODFW to be managed for wild fish. No plantings will occur.

2.8.2.2 Warm Water Game Fish

Largemouth bass, bluegill, pumpkinseed, green sunfish, black crappie and brown bullhead are present in sloughs and reservoirs with the greatest populations in Emigrant Reservoir, Agate Reservoir, Gold Ray Pool and Jackson Fairground Ponds. None of these species is indigenous to western Oregon. Trout and salmon prefer cold, fast-moving waters, while warm-water species prefer quiet, warm waters. Neither group thrives in the other's habitat.

2.8.2.3 Non-Game Fish

Nearly all moderate or low elevation streams in the area support non-game fish. Redside shiners, suckers, carp and Klamath roach are particularly abundant. Many non-game species are important as scavengers of stream detritus, aquatic plants or invertebrates. Some non-game fishes are fed upon by game fishes. Therefore, populations of non-game native fishes are important to the aquatic ecosystem.

2.8.2.4 Other Aquatic Forms

The streams of the JKSYUs support a variety of invertebrate species which are an important part of the fresh water ecosystem. A complete inventory has not been undertaken and data are lacking except for limited information on several orders of insects.

Table 2-7

Cold Water Game Fish
Habitat Status
Jackson - Klamath Planning Area

		Stream miles		Habitat Status[1/]	
Species	Habitat Type	(Total)[1/]	BLM	Quality	(Quantity)
Summer steelhead	Adult migration	304.5	38.9	Fair	Stable
Summer steelhead	Spawning	54.1	7.6	Fair	Decreasing
Summer steelhead	Rearing	77.0	7.6	Poor	Decreasing
Winter steelhead	Adult migration	291.5	26.7	Good	Stable
Winter steelhead	Spawning	203.2	23.7	Fair	Decreasing
Winter steelhead	Rearing	141.0	23.7	Poor	Decreasing
Spring chinook salmon	Adult migration	68.0	3.1	Fair	Decreasing
Spring chinook salmon	Spawning	6.1	0.0	Fair	Decreasing
Spring chinook salmon	Rearing	6.1	0.0	Fair	Decreasing
Fall chinook salmon	Adult migration	43.3	0.6	Fair	Stable
Fall chinook salmon	Spawning	101.5	0.6	Fair	Stable
Fall chinook salmon	Rearing	55.7	0.6	Poor	Decreasing
Coho salmon	Adult migration	204.7	11.6	Fair	Stable
Coho salmon	Spawning	163.9	11.6	Fair	Decreasing
Coho salmon	Rearing	108.8	11.6	Poor	Decreasing
Sea-run cutthroat	Adult migration	291.5	26.7	Good	Stable
Sea-run cutthroat	Spawning	203.2	26.7	Fair	Decreasing
Sea-run cutthroat	Rearing	141.0	26.7	Poor	Decreasing
Resident cutthroat	Spawning	603.5	113.1	Fair	Decreasing
Resident cutthroat	Rearing	603.5	113.1	Decreasing	Decreasing
Resident rainbow	Spawning	687.0	150.6	Fair	Decreasing
Resident rainbow	Rearing	687.0	150.6	Decreasing	Decreasing
Brook trout	Spawning	12.8	3.8	Poor	Stable
Brook trout	Rearing	12.8	3.8	Poor	Stable

1/ Based on 10-year period 1965-75 as determined jointly by BLM and ODFW fishery biologists

2.8.3 Threatened and Endangered Species

An endangered species is defined by Public Law 93-205 (Endangered Species Act of 1973), as "any species which is in danger of extinction throughout all or a significant portion of its range." A threatened species is defined as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." State of Oregon regulations use the same language but add the qualifier, "in Oregon." Table 2-8 lists species of special status.

The bald eagle is the only species listed as threatened on the Federal list known to regularly occur within the SYUs. One nest, active in recent years, has been identified and a large communal roosting area is partially within the planning area, although neither occur on lands administered by BLM.

The northern spotted owl, listed by the State of Oregon as a threatened species, is a permanent resident of the planning area. Known nest locations are indicated in Figure 2-5.

The endangered peregrine falcon can be considered of potential occurrence in the SYUs. According to Browning (1975) none have been seen recently in Jackson County, but a BLM biologist reports probable but unverified recent observations in the Klamath River Canyon.

When a species is being examined to determine if it meets the requirements for either threatened or endangered classification, a notice is published in the Federal Register requesting data and advising that this species is being considered for inclusion. This process is called Notice of Status Review. Three species found in the planning area are currently on this list. Bobcat and river otter are known to be present in areas where suitable habitat exists; however, their population status is unknown. The Siskiyou Mountain salamander uses talus areas within old-growth coniferous forests (Nussbaum 1974). Several areas known to support populations are located within the SYUs' boundary. These locations are shown on Figure 2-5.

2.8.4 Critical Habitat

No habitat considered critical under Section 7 of the Endangered Species Act of 1973 has been declared or nominated within the State of Oregon.

2.9 RECREATION

Not far from the SYUs are three sites of the National Park System: Crater Lake National Park, Oregon Caves National Monument, and Lava Beds National Monument (in California). The National Wildlife Refuges of the Klamath Basin are also nearby. The Rogue and Klamath Rivers transect the units; the Klamath portion has potential for State scenic waterway designation. A 40-mile segment of the Pacific Crest National Scenic Trail passes through the area.

Table 2-8

Threatened, Endangered, or Special Status Animal Species of Known or Potential Occurrence in the JKSYUs.

Species	Federal Status	Oregon Status
Siskiyou Mountain salamander _Plethodon stormi_	N	
Peregrine falcon _Falco peregrinus anatum_	E	E
Bald eagle _Haliaetus leucocephalus_	T	T
Northern spotted owl _Strix occidentalis caurina_		T
River otter _Lutra canadensis_	N	
Bobcat _Felis rufus_	N	

E = Endangered
T = Threatened
N = Notice of Status Review

2.9.1 Recreation Within the SYUs

Figure 2-7 shows the location of all public recreation sites throughout the SYUs. About 3,000 acres of public lands are managed by BLM specifically for recreation. Two Jackson County parks, one City of Medford park, and one State park are on public land and administered under provisions of the Recreation and Public Purposes Act of 1926 (R&PP), as amended. The U.S. Forest Service maintains a number of recreational areas adjacent to the SYUs. Private interests within the SYUs offer diverse recreational opportunities, including guided trips, lodging and eating facilities.

Table 2-9 shows developed site visitation in 1975 for county parks, State parks, U.S. Forest Service and BLM facilities in the planning area. Area appeal, publicity and proximity to travel routes account for the large percentage of non-local overnight use. Water-based recreation accounts for the greatest portion of intensive visitor use in the planning area.

2.9.2 Recreation Related to Public Lands

Table 2-10 lists the number of visits by major recreation activities in the planning area during 1975 and shows percentages of total planning area use attributed to BLM administered land. The BLM estimates that by 1990 visitor use will be at 130 percent of the 1975 figure (Oregon Department of Transportation 1972). These projections, however, do not account for increased leisure time, disposable income and mobility, and counter trends such as inflation and energy shortages.

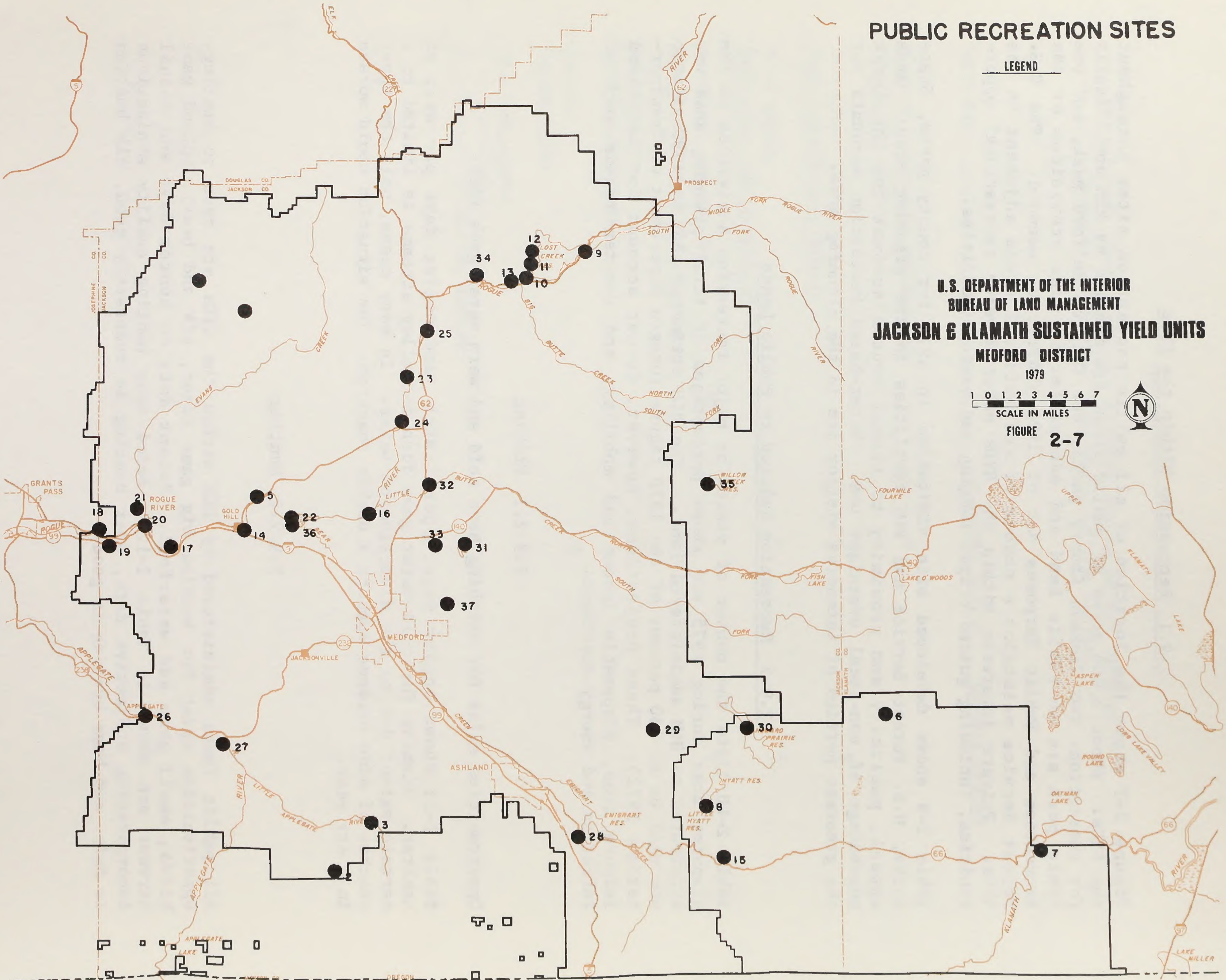
2.9.2.1 Fishing

Opportunities exist for catching both cold and warm water game fish.

Table 2-11 shows angler days, sport catch and angler days per unit of habitat. Fishing for cold water game fish in valley streams is limited to a certain extent due to the diversion of water. In many cases, only the upper reaches of side streams support a usable resource. The situation could worsen in a dry year.

2.9.2.2 Hunting

All public lands administered by BLM within the SYUs are open to hunting. Opportunities exist for hunting big game (deer, elk and bear), upland game birds, small game and waterfowl. Recent data on hunter days and annual harvest are shown in Table 2-12. Based upon hunting quality evaluations incorporating subjective data, deer hunting is moderately good, elk hunting is fair and bear hunting is good.



PUBLIC RECREATION SITES
LEGEND
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
JACKSON & KLAMATH SUSTAINED YIELD UNITS
MEDFORD DISTRICT
1979
1 0 1 2 3 4 5 6 7
SCALE IN MILES
N
PROSPECT
GRANTS PASS
ROGUE RIVER
GOLD HILL
MEDFORD
JACKSONVILLE
ASHLAND
DOUGLAS CO.
JACKSON CO.
JOSEPHINE CO.
LOST CREEK
ROGUE
RIVER
MIDDLE FORK ROGUE RIVER
SOUTH FORK ROGUE RIVER
BIG BUTTE CREEK
NORTH FORK
SOUTH FORK
EVANS CREEK
ELK CREEK
LITTLE BUTTE CREEK
BEAR CREEK
APPLEGATE
LITTLE APPLEGATE RIVER
APPLEGATE LAKE
WILLOW CREEK RES.
FOURMILE LAKE
FISH LAKE
LAKE O' WOODS
HOWARD PRAIRIE RES.
HYATT RES.
LITTLE HYATT RES.
EMIGRANT RES.
EMIGRANT CREEK
UPPER KLAMATH LAKE
ASPEN LAKE
ROUND LAKE
LONG LAKE VALLEY
OATMAN LAKE
KLAMATH RIVER
LAKE MILLER
JACKSON KLAMATH
OREGON CALIFORNIA
5
62
99
140
238
227
66
97
2
3
5
6
7
8
9
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11
12
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FIGURE 2-7

Recreation Sites
(Legend for Figure 2-7)

Bureau of Land Management

1. Battle Creek (closed)
2. Kenny Meadows (DU)
3. Little Applegate (DU)
4. Elderberry Flat (DU)
5. Gold Nugget (DU)
6. Surveyor (ON)
7. Topsy (ON)
8. Hyatt Lake (ON)

U.S. Corps of Engineers

9. Stewart State Park (ON,DU)
10. McGregor Park (DU)
11. Project Day Use Area (DU)
12. Right Bank Access Area (DU)

State of Oregon

13. Casey (DU)
14. Ben Hur Lampman (DU)
15. Tubb Springs (DU)
16. Tou Velle (DU)
17. Valley of the Rogue (ON,DU)

Jackson County

18. Savage Rapids (DU)
19. Savage Creek (DU)
20. Coyote Evans (DU)
21. Palmerton (DU)
22. Gold Ray (DU)
23. Takelma (DU)
24. Dodge Bridge (DU)
25. Shady Cove (DU)
26. Applegate Bridge (DU)
27. Cantrall Buckley (DU)
28. Emigrant Lake (ON,DU)
29. Hooper Springs (DU)
30. Howard Prairie (ON,DU)
31. Agate Lake (DU)
32. Howletts Sunnyside (DU)
33. Sports Park (DU)
34. Rogue Elk (ON,DU)
35. Willow Lake (ON,DU)
36. Fisher's Ferry (DU)

Medford

37. Prescott Park (undeveloped)

ON = Overnight use facilities
DU = Day use facilities

Table 2-9

Estimated Developed Site Visitation, 1975
Jackson-Klamath Planning Area

	Visits	Visitor Days
Jackson County Parks1/		
Day Use	1,322,680	551,120
Overnight Use	130,160	151,860
TOTAL	1,452,840	702,980
State Parks2/		
Day Use	1,638,490	653,510
Overnight Use	72,820	84,950
TOTAL	1,711,310	738,460
USFS		
Day Use	232,500	96,880
Overnight Use	129,600	151,200
TOTAL	362,100	248,080
BLM		
Day Use	33,410	13,920
Overnight Use	20,400	23,800
TOTAL	53,810	37,720
GRAND TOTAL		
Day Use	3,229,830	1,315,420
Overnight Use	352,980	411,810
TOTAL	3,582,810	1,727,230

1/ Excludes urban-oriented use at Sports Park and the ball park.
2/ Figures are for time period July 1, 1975 to June 30, 1976.

Source: USDI, BLM, Medford District

Table 2-10

Approximate Visits Attributed to Major Recreation Activities 1975 1/

	BLM	Other	Total	% Total Use Attributed to Public Land
On-Site Camping	20,400	332,580	352,980	6
Off-Site Camping	64,400	44,660	109,060	59
On-Site Picnicking	33,410	3,123,600	3,157,010	1
Off-Site Picnicking 2/	--	--	--	--
NonPool Swimming	22,800	443,720	466,520	5
Specific Sightseeing	170,910	201,360	372,270	46
Fishing	74,800	309,760	384,560	19
Boating	5,280	51,780	57,060	9
Waterskiing	--	38,720	38,720	0
Hiking	12,000	14,400	26,400	45
Horse Use	51,190	87,430	138,620	37
Cross Country Skiing	2,400	600	3,000	80
Snowmobiling	5,550	47,150	52,700	11
Hunting	45,880	79,880	125,760	36
ORV Use	134,140	231,710	365,850	37
TOTAL	643,160	5,007,350	5,650,510	

1/ Data based in part on Oregon Department of Transportation, Parks and Recreation Branch. Oregon Outdoor Recreation Demand Bulletin, 1975, Technical Document I. Salem: 1976. Fishing data taken from Oregon Department of Fish and Wildlife statistics.

2/ No sound data source is available for this category.

Source: USDI, BLM, Medford District

Table 2-11

Angler Days, Sport Catch and
Angler Days per Unit of Habitat 1/

Species	Estimated Sport Catch	Angler Days	Angler Days per mile
(Rogue Drainage)			
Spring Chinook Salmon	5,650	18,645	252.0
Fall Chinook Salmon	Not Significant		-- 2/
Coho Salmon	Not Significant		-- 2/
Summer Steelhead	5,450	21,800	69.9
Winter Steelhead	10,150	40,600	139.0
Resident Trout	85,071	3,569 (lake)	3.5 3/
		30,072 (stream)	43.7
Warm Water Game Fish	152,390	38,097	33.7 3/
(Klamath Basin)			
Resident Trout	577,146	211,501 (lake)	75.5 3/
		19,357 (stream)	231.5 3/
Warm Water Game Fish	2,120	530	0.2 3/

1/ Indicates importance of production habitat miles to the fishery, not the use occurring on each stream mile.

2/ Significant angling effort does not occur for fall chinook and coho salmon in these upper river areas at this time. Increased habitat quality and releases of juvenile fish from Lost Creek Reservoir and Cole Rivers hatchery may generate increased angler effort in the future.

3/ Indicates angler days/acre lake surface.

Sources: ODFW 1973, 1976.

Table 2-12

Annual Harvest and Hunter Days

	Within Planning Area		Public Lands 1/		Hunter Days/	Harvest/
	Harvest	Hunter-Days	Harvest	Hunter-Days	Square Mile	Square Mile
Black-Tailed Deer 2/	2,476	85,076	891	30,627	42.19	1.23
Roosevelt Elk 2/	56	4,367	19	1,485	2.33	0.03
Black Bear 3/	170	13,548	59	4,741	6.74	0.08
Western Grey Squirrel 4/	1,639	2,729	737	1,228	1.84	1.11
Upland Game Birds 4/5/	9,748	11,222	4,484	5,162	7.26	6.31
Waterfowl 6/	14,215	8,814	4,246	2,633	--	--
Furbearers 7/	3,129	--	975	--	—	—
Total		125,756		45,876		

1/ Prorated from planning area totals by percent BLM habitat in planning area.

2/ Data derived from Oregon Department of Fish and Wildlife Annual Reports, and based on a 3-year average (1974, 1975, and 1976) for Applegate, Dixon, Evans Creek, Keno, and Rogue Big Game Management Units (BGMU).

3/ Data derived from Lowry and Calvin, Annual Survey of Hunters in Oregon During 1975. Hunter days derived by taking statewide average hunter day/bear and multiplying by the total number of bears killed in the five BGMU's given above.

4/ Data for Jackson and Klamath Counties from Lowry and Calvin, Annual Survey of Hunters in Oregon During 1975.

5/ Data for quail, grouse, and band-tailed pigeon.

6/ Data derived from Lowry and Calvin, Annual Survey of Hunters in Oregon During 1975. Hunter days derived by taking statewide average hunter day/bird and multiplying by the total number of birds killed in Jackson and Klamath Counties.

7/ Data for Jackson and Klamath Counties from Oregon Department of Fish and Wildlife, Annual Report, 1976.

Source: USDI, BLM, Medford District. Jackson-Klamath Planning Area Analysis.

2.9.2.3 Sightseeing

People sightsee as they drive through BLM lands, whether or not their destination is on public land. General sightseeing is often referred to as driving for pleasure and is associated with travel along established roadways. Based on 1976 traffic counts along major roads, an estimated 324,440 visitor days were attributed to general sightseeing.

Many people visit public lands with specific sightseeing goals. Others may sightsee while participating in other activities such as hiking or floatboating. Figure 2-8 shows the location of areas which attract botanical, geologic and wildlife sightseeing use.

Specific areas set aside for their botanical, ecological or scientific value are further discussed in Section 2.16.5 (Land Use). Archeologic and historic sites discussed in Section 2.10 also provide sightseeing opportunities.

2.9.2.4 Miscellaneous Recreation Activities

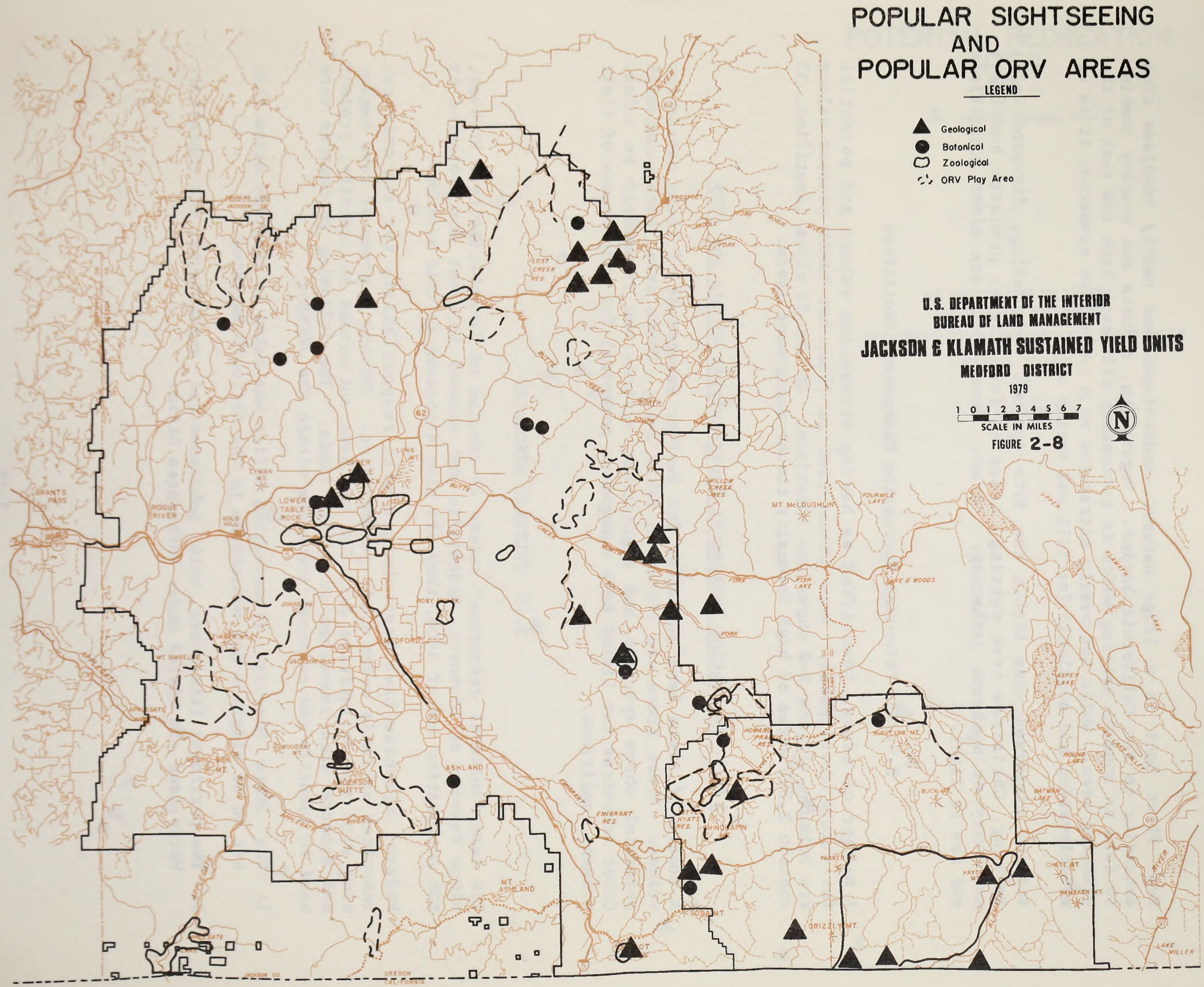
There are few safe, convenient, large snow play areas within the SYUs. Union Creek, Mount Ashland and Hyatt Lake offer winter sports and attract many people. Winter use is on the rise in the southeastern portion of the Klamath SYU.

Emigrant Lake, Howard Prairie Reservoir, Willow Lake, Lake of the Woods, Lost Creek Lake, and the Rogue River offer areas for powerboating. Sailboating is popular at Howard Prairie Reservoir, Emigrant Lake and Lost Creek Lake. No outstanding swimming areas are available within the SYUs. The Rogue River has opportunities for moderate quality floatboating and tubing.

Rock and mineral collectors frequently visit Lost Creek Lake, Alco Creek and Agate Flat. Opportunities for recreational gold panning occur within the Applegate watershed. Because few good areas exist for collectors, use is quite light and dispersed.

Motorcyclists enjoy hill climbing, enduro riding and family touring on public lands within the SYUs. Popular areas are identified in Figure 2-8. No identifiable areas show concentrated four-wheel drive vehicle use, but most abandoned roads and skid trails are used. Snowmobile use is common in the southeastern portion of the Klamath SYU. Other areas for snowmobiling include the Table Mountain Lookout Road, Keno access road, between Hyatt Lake and Chinquapin Mountain, near Anderson Butte, and southeast of Lost Creek Lake.

Much hiking occurs despite the limited amount of maintained trails. Forty miles of the Pacific Crest National Scenic Trail enhance hiking opportunities in this area. Figure 1-1 shows the location of this trail. Winter hiking is restricted to lower elevations. The Tunnel Ridge Trail (from the Little Applegate to the Sterling Mine Ditch) receives considerable fall to spring use. Opportunities for hiking and camping also exist along the 30-mile Lost Creek Trail system.



POPULAR SIGHTSEEING
AND
POPULAR ORV AREAS
LEGEND
Geological
Botanical
Zoological
ORV Play Area
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
JACKSON & KLAMATH SUSTAINED YIELD UNITS
MEDFORD DISTRICT
1979
1 0 1 2 3 4 5 6 7
SCALE IN MILES
FIGURE 2-8
N
PROSPECT
LOST CREEK RES.
ROGUE RIVER
GRANTS PASS
GOLD HILL
LOWER TABLE ROCK
MEDFORD
JACKSONVILLE
ASHLAND
MT. ASHLAND
EMIGRANT RES.
HOWARD PRAIRIE RES.
HYATT RES.
MT McLOUGHLIN
FOURMILE LAKE
FISH LAKE
LAKE O' WOODS
ASPEN LAKE
ROUND LAKE
LONG LAKE VALLEY
KLAMATH LAKE
PARKER MT.
GRIZZLY MT.
SODA MT.
CHASE MT.
SURVEYOR MT.
BUCK MT.
LAKE MILLER
OREGON
CALIFORNIA

Near Pilot Rock is a large natural, undeveloped and nearly roadless area extending to the California border. Vegetation, climate and scenery combine to form an unusual setting which is noticeably different from the rest of the planning area. While not overly attractive as a recreation resource, it is at mid-elevation and available for fall and spring use.

Various dispersed uses within the SYUs include picnicking, firewood collecting, Christmas tree cutting, trapping furbearers, predator hunting, and berry or mushroom gathering. In most cases these are minor activities and use is light.

2.9.2.5 Potential Recreation Management Facilities

A number of sites, identified as having recreation values and potential for future development, were inventoried in 1964, but their present values are unknown. Figure 2-9 shows the locations. Of the 53 sites identified, 35 contain 2,200 acres of high intensity timber management lands.

2.9.3. Recreation Management Opportunities Within the SYUs

A number of areas have potential for further management of their recreation values. These areas are listed in Table 2-13. These areas have management potential where specific and significant actions can reasonably be taken. Other resources not listed have management potential for maintenance of their present conditions.

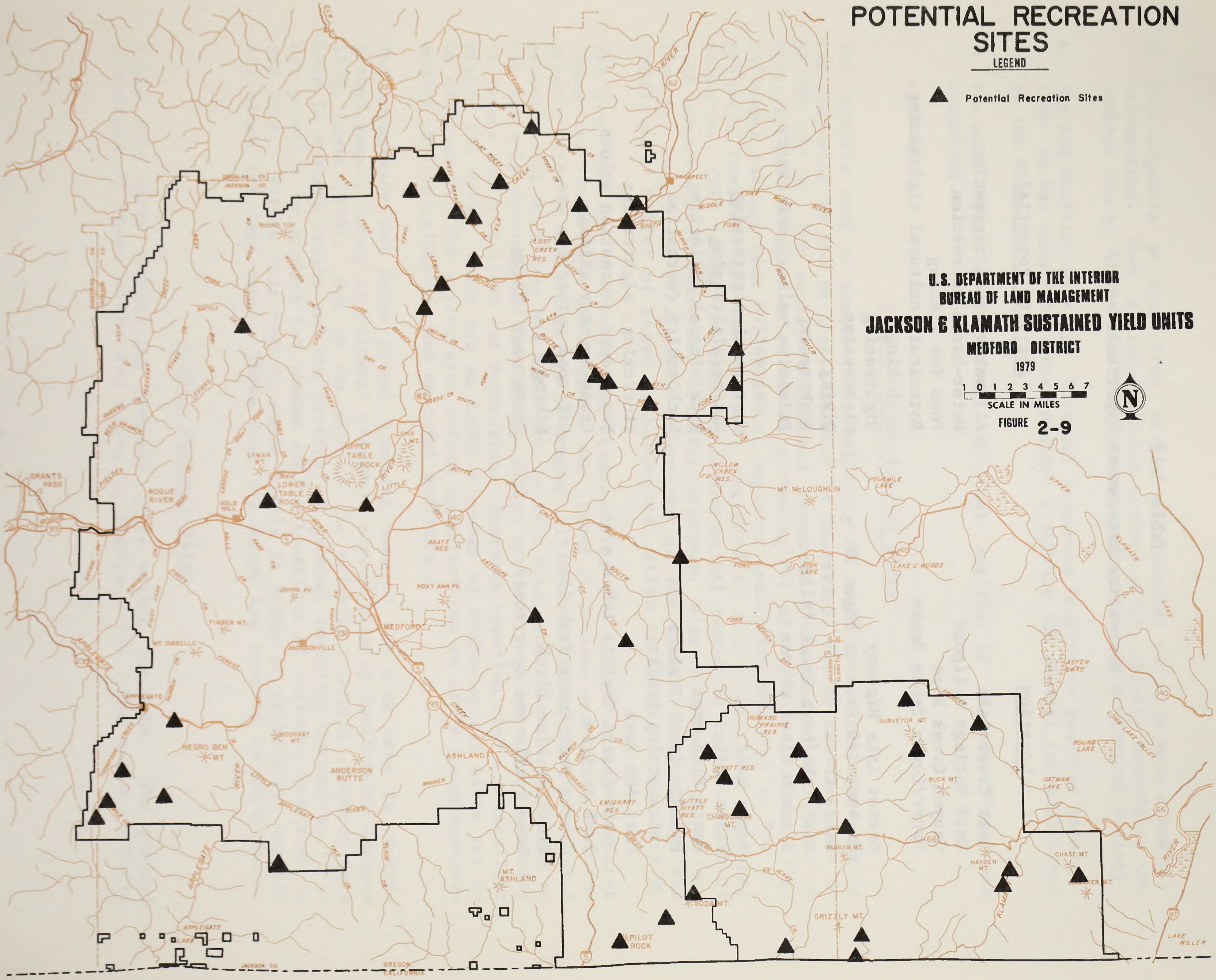
2.10 CULTURAL RESOURCES

The term "cultural resources" refers to remains of human activity. However, since fossils of historic, scientific and unusual interest are protected by the Antiquities Act of 1906, they are also discussed in this section.

Federal agencies have been charged with responsibility for the cultural resources on lands under their jurisdiction. Through a group of laws beginning with the Antiquities Act, BLM has been authorized to identify, protect and enhance such resources on public lands. The following procedures were used to identify the cultural resources within the JKSYUs.

1. The State Historic Preservation Office was asked to identify sites that are on or eligible for nomination to the National Register.

2. The pertinent literature, both published and unpublished, was consulted. Works used are listed under References Cited.



POTENTIAL RECREATION SITES
LEGEND
Potential Recreation Sites
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
JACKSON & KLAMATH SUSTAINED YIELD UNITS
MEDFORD DISTRICT
1979
1 0 1 2 3 4 5 6 7
SCALE IN MILES
FIGURE 2-9
N
PROSPECT
LOST CREEK RES.
UPPER TABLE ROCK
LOWER TABLE ROCK
LYMAN MT.
ROGUE RIVER
GOLD HILL
GRANTS PASS
MT McLOUGHLIN
FOURMILE LAKE
WILLOW CREEK RES.
LAKE O' WOODS
FISH LAKE
AGATE RES.
ROXY ANN PK.
MEDFORD
JACKSONVILLE
JOHNS PK.
TIMBER MT.
MT. ISABELLE
APPLEGATE
NEGRO BEN MT.
WOODRAT MT.
ANDERSON BUTTE
ASHLAND
MT. ASHLAND
EMIGRANT RES.
PILOT ROCK
SODA MT.
GRIZZLY MT.
PARKER MT.
HOWARD PRAIRIE RES.
HYATT RES.
LITTLE HYATT RES.
CHINQUAPIN MT.
SURVEYOR MT.
BUCK MT.
HAYDEN MT.
CHASE MT.
ASPEN LAKE
ROUND LAKE
OATMAN LAKE
LONG LAKE VALLEY
LAKE MILLER
OREGON
CALIFORNIA

Table 2-13

Recreation Management Opportunities

Location	Activity Potential
Lost Creek Lake	All water-based recreation
Cold Springs Helipond	Water-based recreation
Canyon Creek Road	Pond for fishing
Upper/Lower Table Rocks	Botanical, cultural sightseeing, hiking
Crater Lake Highway	Sightseeing
Highway 140 East to Rogue NF	Sightseeing
Butte Creek	Hiking
Lost Lake/Lost Creek Falls	Sightseeing
Klamath River Canyon	Primitive values/backcountry recreation
Topsy Road	Historical sightseeing
Pilot Rock	Hiking/sightseeing
Agate Flat area	Rock/mineral collecting
Pacific Crest Trail & connecting trails	Backcountry recreation
Roxy Ann Peak	Picnicking, sightseeing
Hyatt-Howard Prairie Lakes area	Year-round recreation values
Buck Prairie	Cross-country skiing
John's Peak/Mount Isabelle	Off-road motorcycle use
Sterling Mine Ditch	Hiking
Some trails and spur roads	Horse use; hiking

3. Knowledgeable persons from within and outside the area were asked for information. They included amateur archeologists, elderly residents, the Jackson County Historical Society, and Klamath County Historical Society.

4. The BLM Medford District Cultural Resources Specialist provided information he has acquired through project clearance and general reconnaissance of the area.

5. The most recent listing of the National Register of Historic Places was consulted.

2.10.1 Archeological Sites

The criteria used to assess the eligibility of identified cultural resources for inclusion in the National Register of Historical Places are described in 36 CFR 800.10. BLM employs a Cultural Resources Evaluation System (CRES) to stratify the relative value of an archeological or historical site. Significance ratings from S-1 (National Register nomination quality) to S-4 (no physical remains) are periodically assigned to each identified cultural resource. CRES rating criteria for archeological resources include depth of site architectural features, artistic features, size of site, age of antiquity, length of occupation, uniqueness of the site, representation and condition. A list of known archeological sites is found in Appendix H.

The area has not attracted the attention of the archeological research community. Only eight publications are listed in Johnson and Cole's "Bibliographic Guide to the Archeology of Oregon" (1972). Of the little professional archeological work that has been done in this area, most has been confined to the easterly portions of the Takelma Indian territory. Here sites are easier to locate due to terrain and vegetation. Research opportunities are excellent within the area. There are no doubt a number of archeological sites yet to be discovered. The region also offers opportunities to study human environmental interrelationships and cultural evolution.

The topography and dense forest covering most of the area make an on-the-ground sample survey of cultural resources almost totally ineffective (Aikens 1976; Lovis 1976). Due to the size of the existing cultural resource data base in western Oregon and the futility of general inventory surveying, it is not possible to predict the number and/or locations of cultural resources in the SYUs. Within this region, where little is known of archeology, any and all sites are important. Those that are known are treated as significant.

2.10.2 Historic Sites

Table 2-14 lists inventoried historic sites within the SYUs. The general locations of these sites are shown in Figure 2-10. The table reflects

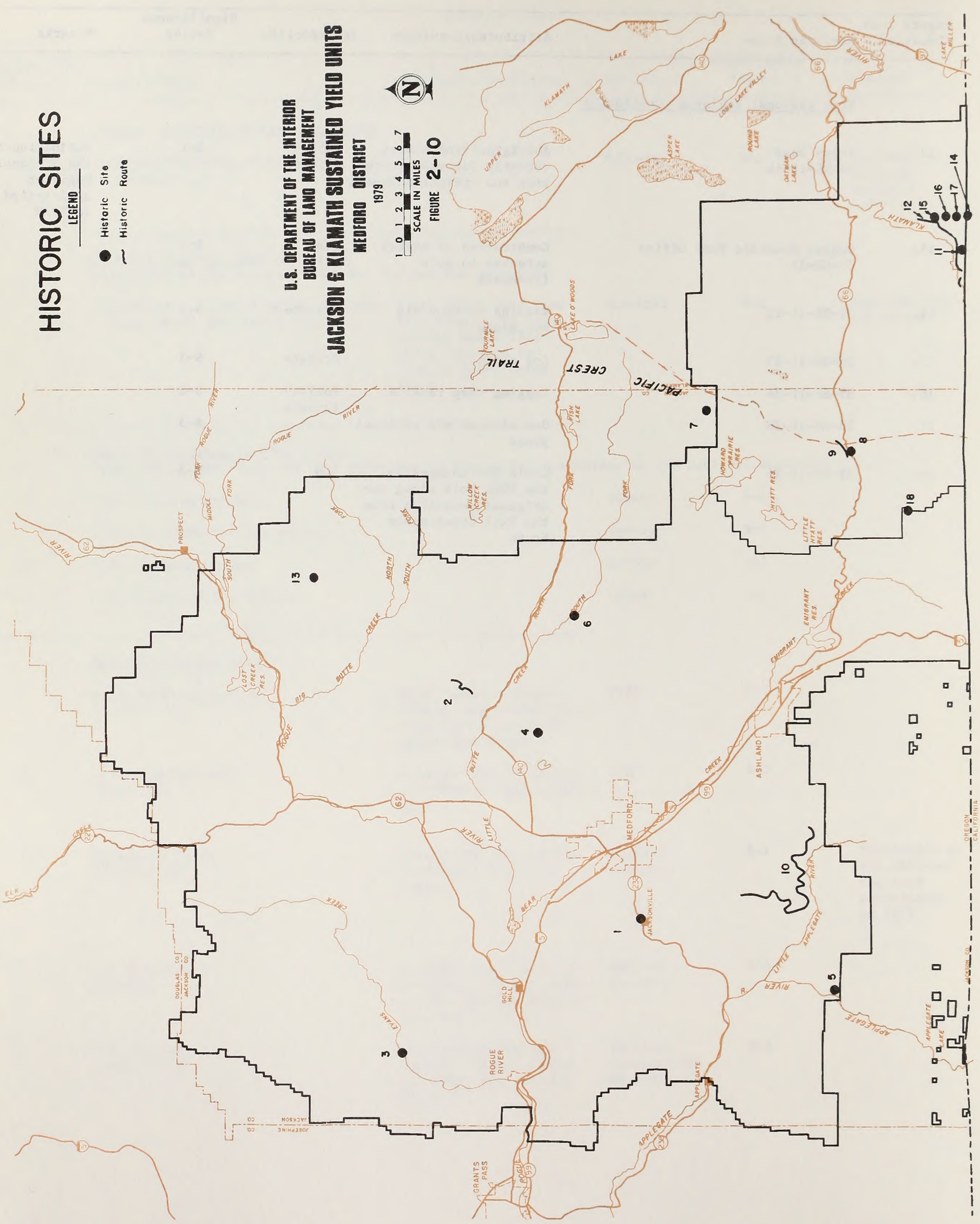
Table 2-14

Historic Sites

Figure 2-10 Location	Historic Sites	Attributes/Condition	Jurisdiction	Significance Rating	Remarks
	National Register of Historic Places				
1.	Jacksonville Historic District Jacksonville		Private	S-1	Entered on National Register 4-11-72
2.	National Register Pending Status (nominated to the National Register but not yet approved)				
	Jacksonville - Fort Klamath Military Wagon Road (Rancheria Trail)	First wagon road from Fort Klamath to Rogue Valley; built 1862-1864; replaced in 1864 by Union Creek Trail	BLM-USFS	S-1	Joint USFS-BLM nomination
	National Register Pending Status (approved by the State Historic Preservation Office for nomination to the National Register)				
3.	Wimer Covered Bridge		County	S-1	
4.	Antelope Creek Covered Bridge		County	S-1	
5.	McKee Covered Bridge		County	S-1	
6.	Lost Creek Covered Bridge		County	S-1	
	Non-National Register				
7.	Brush Mountain Lookout 35-HS-11-2	Built 1915. A topped peeled, and limbed fir tree with a yew wood spiral staircase	USFS	S-3	
8.	Pinehurst Cemetary 35-HS-11-3	Used at turn of century and 1940's. Fair condition	BLM	S-3	
9.	Applegate Trail 35-HS-11-16	Opened 1846 to provide a southern route to Oregon	Public/ Private	S-1	Nomination to the National Register anticipated in 1979
10.	Sterling Ditch 35-HS-11-12	23 mile long ditch designed to carry water to the Sterling Mine on Sterling Creek	Public/ Private	S-2	
11.	Way Cemetery 35-HS-11-13	Well-maintained and fenced. Oldest burial is 1889. Most Recent is 1975	Private (surrounded by BLM)	S-2	

Table 2-14 (Continued)

Figure 2-10 Location	Historic Sites	Attributes/Condition	Jurisdiction	Significance Rating	Remarks
	Non- National Register (Continued)				
12.	Topsy Road 35-HS-11-14	Aboriginal route used recently for transportation and freight shipment	Public/ Private	S-1	Nomination to the National Register anticipated in 1979
13.	Dudley Mountain Post Office 35-HS-15	Constructed of shakes attached to pole framework	BLM	S-3	
14.	35-HS-11-22	Remains of four old buildings	Private	S-3	
15.	35-HS-11-23	Log cabin	Private	S-3	
16.	35-HS-11-24	Logging camp remains	Public/ Private	S-3	
17.	35-HS-11-26	One mile of old railroad grade		S-3	
18.	35-HS-11-36	Cabin 90. Located by the 90th pole along the original powerline from the Fall Creek power house	BLM	S-3	


HISTORIC SITES
LEGEND
Historic Site
Historic Route
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
JACKSON & KLAMATH SUSTAINED YIELD UNITS
MEDFORD DISTRICT
1979
0 1 2 3 4 5 6 7
SCALE IN MILES
FIGURE 2-10
PACIFIC CREST TRAIL
MEDFORD
ASHLAND
JACKSONVILLE
GOLD HILL
ROGUE RIVER
GRANTS PASS
PROSPECT
APPLEGATE
OREGON
CALIFORNIA

the present state of knowledge. Undoubtedly other sites will be added to the list as they are recognized as having significant historical interest. Furthermore, a number of historic sites not included in this listing would not be affected by the proposed action. These are predominantly in currently occupied urban areas (e.g. Medford and Ashland) with buildings or residences of historical interest. A number of these buildings are on the National Register of Historic Places. Historic sites are protected by the same stipulations as archeological sites, and a thorough survey to identify them so they can be protected must be accomplished before ground disturbance or ownership changes can occur.

2.10.3 Paleontology

Fossils are an important and nonrenewable resource. Vertebrate and certain invertebrate fossils are protected within the scope of the Antiquities Act. While the SYUs have not been thoroughly surveyed, vertebrate, invertebrate, and plant fossils are known to occur.

Fossils found within the SYUs include leaves (including palms and sequoia), fossils of mastodon, elephant, bison and horse (Wells 1956).

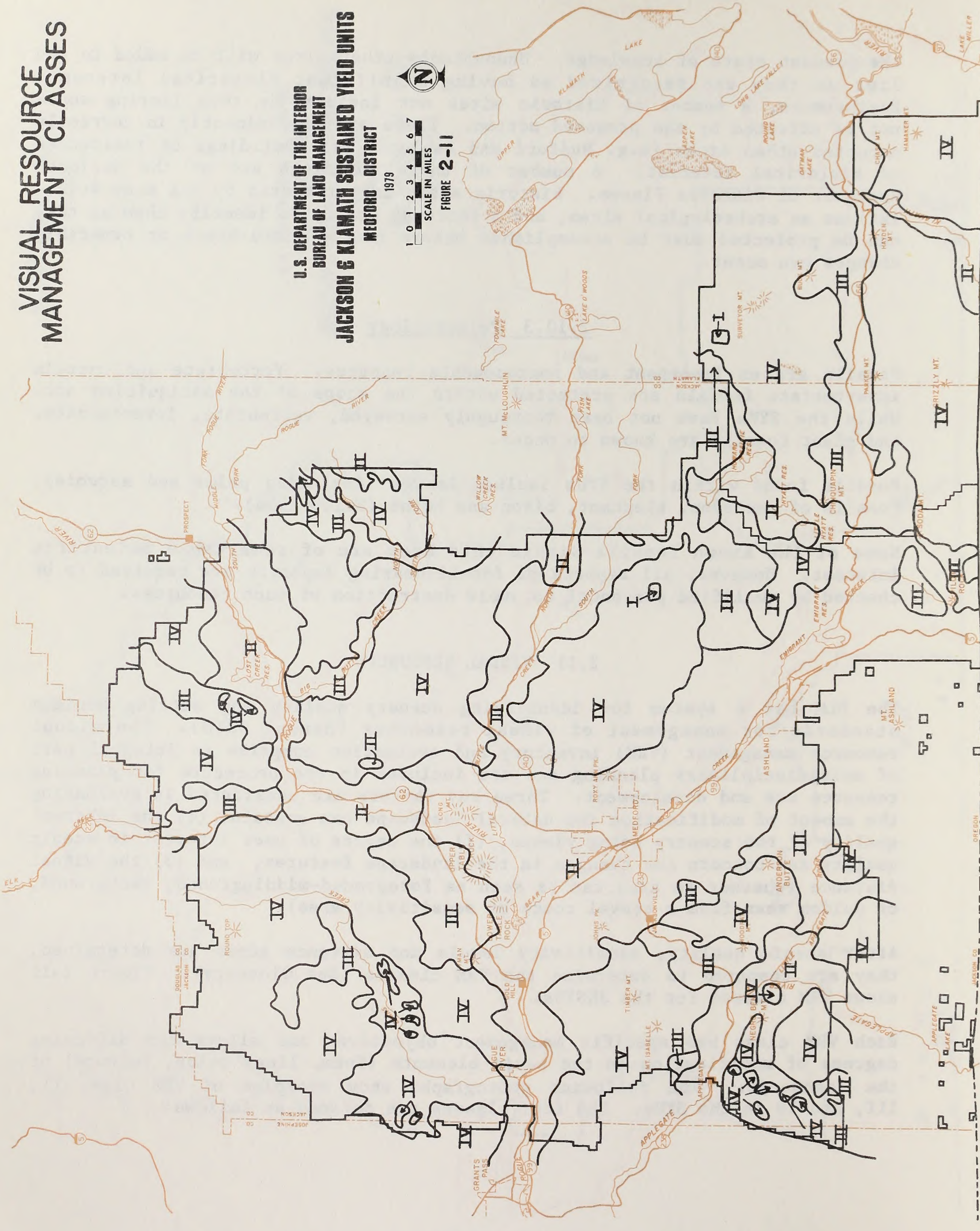
None of the known fossils within this area are of remarkable scientific interest. However, all reports of fossil-bearing deposits are required to be checked by qualified personnel to avoid destruction of such resources.

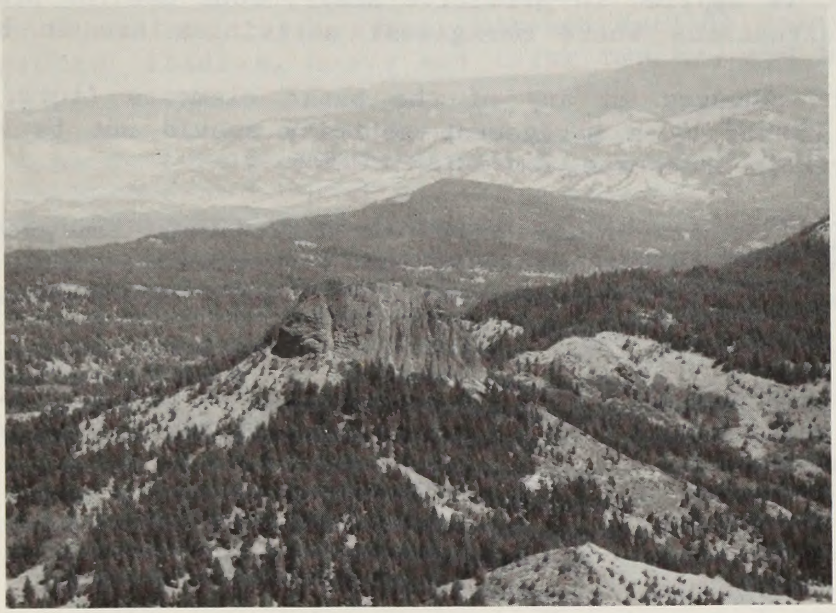
2.11 VISUAL RESOURCES

The BLM has a system for identifying scenery quality and setting minimum standards for management of visual resources (Manual 6310). The visual resource management (VRM) inventory and evaluation comprise an integral part of multidisciplinary planning and are included in the procedure for planning resource use and development. Three key factors are considered in evaluating the amount of modification the natural landscape can sustain: (1) the inherent quality of the scenery being viewed, (2) the degree of user interest in scenic quality and concern for changes in the landscape features, and (3) the visual distance (whether an area can be seen as foreground-middleground, background, or seldom seen from a travel route or sensitivity area).

After scenic quality, sensitivity levels and distance zones are determined, they are compared to determine the VRM classes (See Glossary). Figure 2-11 shows VRM classes for the JKSYUs.

Each VRM class has specific management objectives and allows for differing degrees of modification in the basic elements (form, line, color, texture) of the landscape. The following photographs show examples of VRM Class II, III, and IV in the SYUs. The four classes are defined as follows:


VISUAL RESOURCE
MANAGEMENT CLASSES
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
JACKSON & KLAMATH SUSTAINED YIELD UNITS
MEDFORD DISTRICT
1979
0 1 2 3 4 5 6 7
SCALE IN MILES
FIGURE 2-11



Pilot Rock is managed under VRM Class II objectives; the surrounding land is VRM Class III.

Examples of VRM Class III and IV land can be seen on Dead Indian Plateau.

Class I: This class provides primarily for natural ecological changes only. It is applied to primitive areas, some natural areas, and other similar situations where management activities are to be restricted.

Class II: Changes in any of the basic elements (form, line, color, texture) caused by a management activity should not be evident in the characteristic landscape.

Class III: Changes in the basic elements (form, line, color, texture) caused by a management activity may be evident in the characteristic landscape. However, the changes should remain subordinate to the visual strength of the existing character.

Class IV: Changes may subordinate the original composition and character but must reflect what could be a natural occurrence within the characteristic landscape.

2.12 WILDERNESS VALUES

Under the terms of the Federal Land Policy and Management Act of 1976 (FLPMA), roadless areas of 5,000 acres or more that have wilderness characteristics are to be reviewed within 15 years for possible wilderness designation. The 1976 Act, however, also states that in the event of inconsistency between it and the O&C Act insofar as they both may relate to management of timber resources, the O&C Act prevails. Accordingly, the wilderness review provisions do not apply to O&C lands which are suitable for sustained yield management as commercial timber lands.

The wilderness review for the JKSYUs has begun. In August 1979, the Oregon State Director announced his final decision on the initial phase of the wilderness inventory. The 6,100-acre Soda Mountain area has been recommended for a more intensive inventory to determine whether it has wilderness characteristics. If it does, it will be designated as a wilderness study area. Some tracts within the JKSYUs were examined but were not recommended for more intensive inventory. The initial inventory and accompanying maps of roadless areas and islands in Oregon and Washington are available in the Oregon State Office and BLM district offices.

2.13 NOISE

Ambient noise is the all-encompassing noise within a given environment representing a composite of sounds from all sources. Although no noise level surveys have been conducted within the SYUs, other data from similar areas indicate that maximum ambient levels average 35-40 decibels measured on the A scale (dBA). This range is in the faint to moderate level of human hearing (AMF 1971). At the bank of a small stream, noise level is approximately 45 dBA.

Most of the public land within the SYUs is used for timber production, and noise generated within the forest reflects these sounds. Sources of noise generation associated with timber harvest include dozers, skidders, chain saws, yarders, loaders, heavy and light trucks, and human voices.

2.14 TIMBER MANAGEMENT

The current timber management plan implemented in fiscal year 1972 (July 1, 1971) is based on the principle of sustained yield management and environmental quality standards.

Timber management procedures of the 1972 plan include harvest either by clear cut or three-stage shelterwood. Road construction is also a part of the timber management land program.

Annual timber sale plans of the Medford District contain site specific information on individual proposed timber sales. Information listed in an annual plan includes the location of the proposed sale, approximate volume to be harvested, cutting practices to be followed, method of logging, road construction and access requirements, special contractual provisions, and other relevant data.

The allowable cut plan recognizes a necessity for prompt regeneration of areas receiving final harvest cut. Annual programs for artificial regeneration, stand improvement and site conversion are among the silvicultural practices employed to achieve full productivity from commercial forest lands. Table 2-15 summarizes data on timber sales and shows the acreage which has been treated during the present allowable cut plan period.

The timber management program in the Jackson and Klamath SYUs can be severely altered by disruptive factors such as significant increases of insect populations or disease, large wildfires, or major windstorms. When these catastrophic events occur, changes in the timber harvest plan may result. These changes could take on the form of 1) selection of different methods of harvesting timber, 2) accelerating the annual cut over a period of time, 3) altering locations of timber harvest and/or marketing areas, or 4) creating the necessity for unusual rehabilitation programs in the area.

Unauthorized cutting and/or removal of forest products, i.e., timber, Christmas trees, cedar shake bolts or posts and firewood, occurs sporadically throughout the JKSYUs. As the value of these products (especially high-quality cedar) increases, the incidence of willful trespass also increases.

Table 2-15

Timber Sales and Management Practices

Timber Sales	FY 72	FY 73	FY 74	FY 75	FY 76 1/	FY 77	FY 78
Clearcut (acres)	948	685	438	409	465	294	446
Partial Cut (acres)	12,136	10,729	11,150	14,029	18,440	9,713	9,110
Volume Sold (MM bd. ft.)	124,518	113,548	127,085	132,199	121,547	133,633	128,629
Treatments							
Transportation System							
Miles of permanent road constructed	91.2	85.0	78.3	61.2	90.4	80.2	56.9
Miles of existing road reconstructed	21.3	44.7	38.7	39.4	70.7	52.8	76.5
Slash Disposal (acres)							
Burning	0	0	0	0	95	40	315
Gross Yarding (including machine piling)	1,528	1,520	1,782	2,605	6,723	3,932	2,494
Site Preparation (acres)							
Herbicide	120	172	120	0	0	0	0
Mechanical Scarification	0	0	0	116	0	180	1,204
Planting (acres)							
Replant and Interplant (existing non-stocked or understocked clearcuts)	277	736	1,282	692	632	616	705
Initial Planting (new clearcut & shelterwood regeneration cut areas)	157	88	139	178	642	913	897
Replant & interplant (new cutting areas not adequately stocked by initial planting. Includes areas receiving overstory removal)	0	0	0	0	0	0	187
Herbicide Release (acres)	113	18	0	0	0	0	237
Precommercial Thinning (acres)	98	109	0	15	329	227	65
Fertilization (acres)	0	0	80	0	0	0	133
Commercial Thinning (acres)	0	0	0	28	50	323	99
Gopher Control (acres)	150	0	0	0	0	180	300

1/ Fifteen month fiscal year

Source: USDI, BLM, Medford District 1978.

2.15 AGRICULTURE AND GRAZING

2.15.1 Agriculture

In 1969, approximately 28.6 percent of the land in Jackson County was used as agricultural land (Ruttle 1973). Of this, 46,688 acres, or 9 percent, of Jackson County was irrigated land.

High value irrigated crop land within the SYUs occurs on the floodplains of the Rogue River and its tributaries from the Sams Valley area downstream to Gold Ray Dam, and on the flood plains and low foothills along Bear Creek downstream from Ashland to its confluence with the Rogue River. Additional cropland in lesser amounts occurs in the Applegate drainage and up Butte and Little Butte Creeks. Much of this agricultural area is undergoing subdivision and settlement. Over 600 acres of BLM lands in the Jackson SYU have been zoned for agricultural and residential uses.

Certain lands have been defined by the Soil Conservation Service (SCS) as being of prime agricultural value. Approximately 8,000 acres of BLM lands are included in this definition only if irrigated. Irrigation water is not presently available to these lands, nor is likely to be, since significant water sources are fully appropriated.

2.15.2 Grazing

Livestock grazing on all public land in the Medford District is by lease, as authorized under Section 15 of the Taylor Grazing Act (June 28, 1934) and Section 4 of the O&C Act (August 28, 1937). The latter Act permits grazing only if it does not interfere with timber production or other purposes specified in Section 1 of the O&C Act.

In the SYUs there are 119 leases covering 402,000 acres of public lands. With the exception of one allotment which is leased for sheep, all the leases are for cattle. In addition, there are approximately 150,000 acres of private land under exchange of use agreement with the BLM for grazing purposes. Under this agreement BLM has the management and control of the private lands for grazing purposes. Fences, therefore, are not required to separate private and public grazing lands.

The unit by which livestock forage on Federal lands is quantified for production and use is the animal unit month (AUM). An AUM is defined as the amount of forage (of any combination of vegetative species) necessary for the subsistence, in a healthy state, of one cow (more than 6 months old) for a period of one month. An animal unit is one mature cow (and calf under 6 months), five sheep or equivalent numbers of other herbivorous species. Presently, 22,361 AUMs are leased on public lands in the JKSYUs. In general, the private lands upon which the grazing preference for these leases is based would not support year-round livestock operations; the operators are dependent on the Federal range for a portion of their forage needs. For the most part, the private lands are located at the lower elevations and are used for production of hay

for winter feed, with some fall grazing on crop residue. The leased BLM land, intermixed with the private land, in general provides spring and summer forage. In some cases, additional forage is provided in the summer from Forest Service lands.

Of the 119 grazing lessees in the SYUs, 60 are at least partially dependent on BLM for spring range, 14 for summer range, and 45 for both. Most of this use occurs in Jackson County. Livestock use on the spring range starts April 1 or later, due to wet soil conditions. Spring range is normally below the 3,500 foot level, but varies between the north and the south half of the planning area. Livestock use on the summer range generally begins after June 1 and ends by October 15.

Livestock forage value in the planning area is relatively high because of grasses, forbs and brush high in protein. Livestock forage value in the forested areas is related to the amount of logging that has taken place within the allotment and the amount of time that has elapsed since the final cut. Livestock generally seek out grass and forb species earlier in the summer, then change to brush species when grass cures, though always eating a certain amount of grass throughout the summer. After logging, brush is dominant in the north and west portions of the SYUs while grasses are dominant in the south and east. Livestock tend to concentrate on the better grass, shrubs and wet meadows, resulting in a distribution problem and some overuse of the better forage areas.

Most of the land identified as "non-forest land" and "non-commercial forest land" under TPCC (grassland, brushland, and woodland composed of oak and other noncommercial species), is leased for grazing; this amounts to about one-fourth of the public lands within the SYUs (see Table 1-3 in Section 1.2.1). Approximately 285,000 acres of land with commercial timber are also contained within grazing allotments.

Trend studies have recently been initiated, but data are not yet available. Based on visual observation by district personnel, the trend on most of the lease areas is downward, generally due to continuous season-long grazing use and lack of intensive grazing management systems.

Presently there are six allotments totaling 82,000 acres that have grazing management systems on them: they are Big Butte (24), Summit Prairie (31), Cascade Ranch (121), Soda Mountain (110), Laubacher (102) and Hopkins (107). Most plans were developed cooperatively with the ranchers, Soil Conservation Service, Forest Service, and adjacent private landowners. These plans incorporate rest-rotation grazing principles on the spring range and deferred or rest-rotation on the coniferous forest areas during the summer. Fencing the allotments into pastures is also a facet of some plans. Management of public lands alone is difficult, because of the large amount of intermingled private lands involved.

There are no recorded land treatment projects for livestock forage development. Management facilities such as water developments and fencing are necessary for livestock management. Many more such facilities are needed to

adequately control and manage the grazing use, so that additional damage does not occur to the soil and vegetation resources. However, these facilities are often considered a nuisance in commercial forest during timber harvest.

Absence of adequate management facilities and grazing systems results in poor distribution which causes problems with wildlife habitat and silviculture activities. Livestock that enter areas too early in the spring can also cause soil compaction and trample vegetation, including tree seedlings.

An adequate quantity of water, mainly from springs and creeks, is available. Fire protection reservoirs add to the natural water resource. Approximately 90,000 gallons of water are used daily by livestock. Available water affects livestock distribution and results in some areas being excessively grazed.

2.16 MISCELLANEOUS LAND USE

2.16.1 Mining

A variety of minerals are known or suspected to occur on lands administered by the BLM. These include gold, silver, silica, tungsten chromium, manganese, oil shale, coal, geothermal energy and quarry products.

Generally, these minerals are not presently economical to extract. With the exception of a few one or two-person gold placer operations in the Applegate area, most mines are inactive.

Saleable mineral commodities in the planning area consist mostly of sand and gravel deposits occupying lower valley areas and quarry products in mountainous areas. Sand and gravel in valleys occur mostly on private land and are used locally for construction material. Quarry products from public lands are used for construction and maintenance of timber access roads. Based on 1972-1976 data, an average of 136,120 cubic yards of quarry products per year have been required for BLM roads in the SYUs.

2.16.2 Urban and Built-up Areas

Approximately 37,800 acres in Jackson County were considered urban and built-up as of 1977. Types of land use in this category are residential, industrial, commercial, institutional and transportation (Personal Communication, Webber 1979).

The area between Ashland and the Rogue River (which includes the built-up areas of Ashland, Phoenix, Talent, Medford, Jacksonville, White City and Central Point) is known as the Bear Creek Urbanizing Area (BCUA). The largest concentration of urban residential land uses occurs in the Medford area, including White City and Central Point, and in the Phoenix-Talent-Ashland area. Almost 400 acres of BLM-administered lands lie within the BCUA.

Residential land uses also intermingle with agricultural uses. Communities and single residences are located on the flood plains of the Rogue River from Prospect to the city of Rogue River; along the Applegate River from the settlement of Buncom to the village of Applegate; and in the valleys formed by Butte Creek, Evans Creek and Bear Creek, and their tributaries.

2.16.3 Rural Residential

In 1976, more than 48,000 Jackson County residents (42 percent) were living in the country or in communities of less than 1,000 population. There is an observed trend of increases in single family rural residence and rural subdivisions in Jackson County and throughout the SYUs. (No documented data available). Almost 500 acres of BLM-administered lands have been zoned by Jackson County for rural-residential uses. In addition to BLM lands located within the BCUA, over 200 acres of public lands are within a portion of Klamath County that is expected to increase in rural population.

2.16.3.1 Rural Residential Use on Public Lands

Some of the existing rural residences are on lands adjacent to public lands. Several residences are on BLM lands either as a result of mining or small tract leases or in trespass.

Tracts of public land less than 5 acres in size have previously been leased under the Small Tract Act of June 1, 1938, which was repealed by P.L. 9579. There are presently 19 small tract leases on 11.58 acres of BLM lands which expire in 1979 and 1980. In addition, there are four recently expired leases on 12.19 acres. It has not yet been decided what will happen to the homes when leases expire.

Six tracts comprising less than 23 acres have been leased on a life tenancy basis under the provisions of the Mining Claim Occupancy Act of October 23, 1962. This Act expired in 1971, precluding further leases.

There are 53 cases of registered trespass occupancy. At least 13 of these involve occupancy of unpatented mining claims. In addition to known residential trespass, 36 suspected cases remain to be investigated. There are also many abandoned structures in the SYUs, some of which are probably occupied.

2.16.4 Water Facilities

Numerous rights-of-way for water facilities have been granted on BLM lands. The exact number of grants has not been tabulated. Most applications are for pipeline rights-of-way to provide domestic water to private dwellings and ditch rights-of-way to provide irrigation water to agricultural lands. Approximately 15 residences are authorized to use water from BLM lands for domestic needs.

Many unauthorized domestic water facilities are suspected to exist on public lands. Often the facilities are already constructed when application for authorization is made. The number of such applications is increasing as the rural population grows.

2.16.5 Ecologically Significant Areas

Two parcels of land have been nominated for research natural area designation. The Surveyor Area, a 60-acre site, represents a mature white fir-Douglas-fir forest in the High Cascades. Lost Lake, an example of a low elevation lake surrounded by mixed conifer forest, is about 480 acres in size. The Lost Lake area has an excellent representation of flora and fauna.

Upper Table Rock will be nominated for research natural area designation. It is a basaltic cap rock standing high above surrounding rural residential and agricultural land.

The Hollenbeck Natural Area is managed as an environmental study area, but no formal designation is expected. The area is of interest to local botanists, both amateur and academic.

Twenty-four additional sites, identified by the Oregon Natural Heritage Program as being ecologically valuable, are only partially on BLM land. Figure 2-12 shows the approximate location of all 24 areas, as identified by the Oregon Natural Heritage Program (Nature Conservancy 1977, 1978).

2.16.6 Transportation

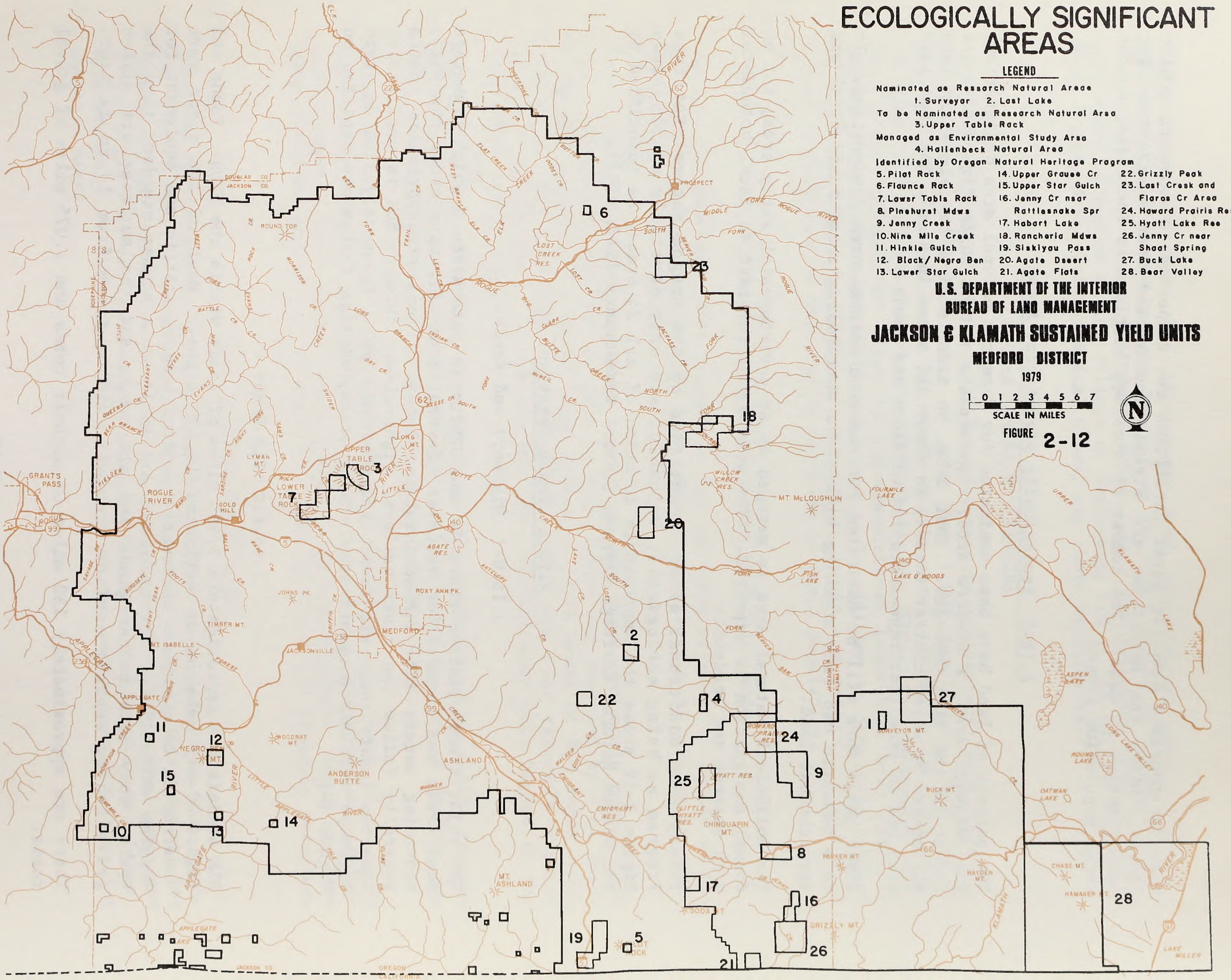
2.16.6.1 Highways and Roads

The major transportation route in the JKSYUs is Interstate 5 which traverses Bear Creek and Rogue River valleys. Several State highways cross the SYUs, providing access into BLM-administered lands. Since transportation routes generally follow the river valleys, right-of-way through BLM is negligible. Numerous county roads are found throughout the SYUs, frequently linking State highways with BLM access roads. Major transportation routes are depicted on Figure 1-1.

2.16.6.2 BLM Roads

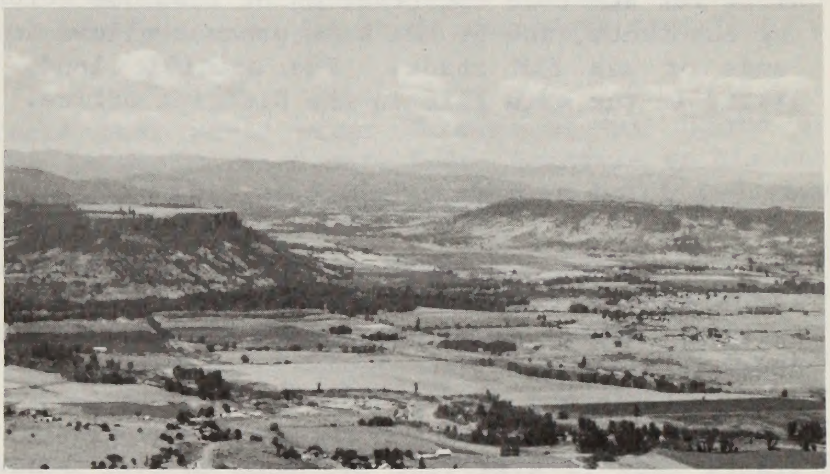
BLM administers approximately 2,500 miles of roads within the SYUs. Roads and rights-of-way make up an estimated 11,700 acres. Most of the roads were constructed to standards necessary to carry logging traffic and equipment for logging activities. The mainlines are built to a higher standard than the spurs; they have better grade and alignment; and the surfaces are either gravelled or asphalt surface treated. Widths range from 17 to 24 feet.

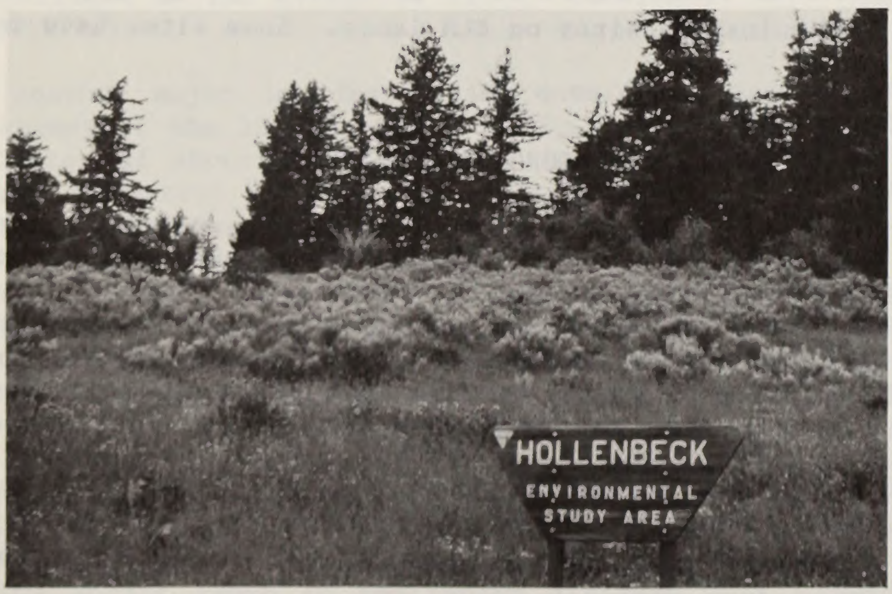
There are approximately 130 miles of asphalt roads and 1,075 miles of gravel roads.


ECOLOGICALLY SIGNIFICANT AREAS
LEGEND
Nominated as Research Natural Areas
1. Surveyor 2. Lost Lake
To be Nominated as Research Natural Area
3. Upper Table Rock
Managed as Environmental Study Area
4. Hollenbeck Natural Area
Identified by Oregon Natural Heritage Program
5. Pilot Rock
6. Flounce Rock
7. Lower Table Rock
8. Pinehurst Mdws
9. Jenny Creek
10. Nine Mile Creek
11. Hinkle Gulch
12. Black/Negro Ben
13. Lower Star Gulch
14. Upper Grouse Cr
15. Upper Star Gulch
16. Jenny Cr near Rattlesnake Spr
17. Hobart Lake
18. Rancheria Mdws
19. Siskiyou Pass
20. Agate Desert
21. Agate Flats
22. Grizzly Peak
23. Lost Creek and Floras Cr Area
24. Howard Prairie Res
25. Hyatt Lake Res
26. Jenny Cr near Shoat Spring
27. Buck Lake
28. Bear Valley
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
JACKSON & KLAMATH SUSTAINED YIELD UNITS
MEDFORD DISTRICT
1979
1 0 1 2 3 4 5 6 7
SCALE IN MILES
N
FIGURE 2-12

Negro Ben Mountain

Lower Table Rock (left)
and
Upper Table Rock (right)





Spur roads are constructed narrower and steeper than the mainlines and are sometimes surfaced. Width varies from 14 to 17 feet. About 800 miles of roads are dirt, including 55 miles of jeep trails.

Approximately 1,100 miles of road are maintained by BLM and timber purchasers. The remaining roads are not maintained on a regular basis, but at periodic intervals, as the roads are used for timber harvesting.

Exclusive easements are acquired for roads across private lands not covered by right-of-way agreements. Easement widths are usually 60 feet wide with additional width being acquired if necessary.

Permits and right-of-way agreements with the larger private timber companies allow for BLM road construction or road use across their lands without acquiring easements, and by the same process allows for them to construct across BLM lands or use BLM roads. The specific lands covered in the agreement are listed in the main file in the District Office.

2.16.7 Utilities and Communication Sites

There are over a hundred miles of utility rights-of-way on BLM-administered lands within the SYUs. While many of the rights-of-way are adjacent to existing roads, there are also numerous cross-country telephone and electric lines.

The number of individual rights-of-way grants has not been tabulated. The grants vary in size from 0.1 acre to over 6 acres. They necessitate special provisions for timber harvesting in their immediate areas. Additional road rights-of-way over public lands are occasionally required for access and maintenance of facilities.

There are six communication sites on BLM lands. Some sites have more than one user.

2.17 ECONOMIC CONDITIONS

Due to the relationship of the planning areas to county boundaries, log destinations, and trade and service regions, the primary focus of the economic assessment relates to Jackson County.

Between 1974 and 1976, about 75 percent of the logs harvested in the JKSYUs were processed in Jackson County. Over 70 percent (1.3 million acres) of Jackson County's land area is commercial timberland. The lumber and wood products industry is the major industrial/manufacturing employer. Consequently, the county's economy, like the forest products industry, is influenced by cyclic changes in the nation's construction and home building industries. The seasonal nature of the timber industry also results in some seasonal

unemployment. In recent years, timber based employment has been declining as a percent of total county employment.

Jackson County's population, particularly its urban population, has been increasing at a faster rate than that of Oregon or the United States. Although the county's per capita income has historically been lower than the State's, the disparity between the two is widening each year. Medford, a long-time center of agricultural processing and lumber manufacturing, is also the county seat. It alone received over 60 percent of the logs harvested in the JKSYUs between 1974 and 1976. Whereas the labor force in southwestern Oregon generally is dominated by blue collar workers, white collar employees--especially business and clerical--make up a significant portion of the labor force in Medford. Its distance from other major urban distribution centers such as Eugene and Portland to the north and Redding and Eureka, California, to the south, has caused Medford to become an important secondary distribution center.

Any noticeable economic effects that would occur outside of the JKSYUs or Jackson County are most likely to appear in Grants Pass, Glendale or Klamath Falls. Although these locations will be addressed later, a brief overview of each area is presented below.

Grants Pass is the major urban/industrial center in Josephine County, which is immediately west of the JKSYUs. The county seat and a regional service center, Grants Pass had a 1977 population of about 14,000 people. Wholesale and retail trade, lumber and wood products manufacturing, and service industries provide the major sources of employment. Since the community's economic base relies heavily on the timber industry, timber management on public lands is a major community concern. Between 1974 and 1976, 16 percent of the logs processed in Grants Pass were harvested on public lands in the JKSYUs. A more detailed economic description of Grants Pass and Josephine County, in particular, is available in the Josephine Timber Management Environmental Statement (USDI, BLM 1978a).

Glendale, another major log destination outside of Jackson County, received about 5 percent of the logs from the JKSYUs between 1974 and 1976. It had a 1970 population of about 700 people; is largely dependent on the lumber and wood products industry; and is located about 55 miles northwest of Medford on the southern edge of Douglas County.

Klamath Falls, a major urban community east of the Cascades, received about 3 percent of the logs from the JKSYUs from 1974 to 1976. Here also, lumber and wood products are the major industry. Ninety-two percent of Klamath County's 1975 manufacturing earnings and 20 percent of its personal income came from lumber and wood products.

Although about one-fifth of the planning area is located in Klamath County, the economic importance of JKSYUs' timber resources to Klamath County's economy is relatively insignificant. For example, from 1973 to 1976, timber harvest from public lands in the JKSYUs averaged only 4 percent of Klamath

County's total harvest. Less than 1 percent of the timber processed in the county came from the JKSYUs.

2.17.1 Timber-Based Employment

Covered employment in the lumber and wood products industry between 1974 and 1976 averaged about 16 percent of all industrial employment in Jackson County. Beaton (1978) suggests that the percent of Jackson County°s labor force employed in the lumber and wood products industry appears to be decreasing. Although the industry seems to have retained a consistent share of total manufacturing employment since the 1940's, manufacturing has declined in relative employment as the trade and services sectors have expanded.

Short-term employment trends are volatile. As explained by Beaton, the industry depends heavily on fluctuating levels of new residential construction, a very cyclical industry. This was apparent when the nation's housing starts fell during 1975 to 1.17 million units and lumber and wood products employment in Jackson and Josephine Counties averaged 6,610 jobs. In 1976, housing starts increased to about 1.55 million units. Lumber and wood products employment increased 13 percent, to an annual average employment of 7,490. The upward trend in lumber employment continued in 1977 and 1978.

The long-term trend for lumber and wood products employment is downward due primarily to a declining timber supply and technological changes within the industry.

According to Beuter et al. (1976), a continuation of present timber management policies on all lands would result in a 22 percent decrease in western Oregon timber harvest by the year 2000. Although Jackson County's decline in harvest probably would not be as severe (approximately 18 percent in the Medford timbershed according to Wall (1977)), long-term supply factors indicate a decline in timber-related employment is likely.

At the same time, technical innovations within the industry are expected to increase productivity per manhour while reducing the number of jobs. (Labor reductions will probably occur in the lower skilled labor-intensive segments of the industry, i.e., sawmill activities.) Even the recent increase in veneer and plywood manufacturing employment may be reversed for technological and market-based reasons.

Table 2-16 summarizes projected changes in employment per million board feet for relevant sectors of the lumber and wood products industry. A detailed explanation of how these projections were derived is available in Appendix K of the Final Environmental Statement on the Ten-Year Timber Management Plan for the Josephine Sustained Yield Unit (USDI, BLM 1978a). Table 2-17 expands the timber employment analysis by showing projected future timber harvests in the Medford timbershed and the employment supported in logging and primary timber processing by timber harvest. Finally, Table 2-18 displays the estimated numbers of employees per million board feet of timber harvested from the JKSYUs and processed in Douglas, Jackson, Josephine and Klamath Counties.

Table 2-16

Projected Productivity in Lumber and
Wood Products Industry in the Western Oregon Timbershed

	Employees per Million Board Feet						
	1970-75 Annual Average	1980	1990	2000	2010	2020	2030
Logging	1.60	1.35	1.22	1.09	1.01	0.96	0.91
Sawmills & Planing Mills	4.12	3.74	3.30	2.79	2.42	1.97	1.53
Veneer & Plywood	7.18	6.57	5.68	5.12	4.60	4.14	3.73
Pulp & Paper1/	0.94	0.63	0.57	0.52	0.46	0.42	0.38

1/ Employees supported in Oregon by total harvest in Medford Timbershed.

Source: Wall, Brian R. Impacts in the Medford Timbershed Associated with Bureau of Land Management Harvesting Alternatives in the Josephine Sustained Yield Unit. USDA Forest Service, Pac. Northwest For. and Range Exp. Sta., Portland, Oreg. 1977. In Josephine Sustained Yield Unit Ten-year Timber Management Plan Final Environmental Statement. USDI, BLM. 1978.

Table 2-17

Projected Timber Harvest and Related Employment in Medford Timbershed

	Decade						
	1968-78	1975-85	1985-95	1995-2005	2005-2015	2015-2025	2025-2035
Timber Harvest for all Sources (million board feet Scribner)	603	609	599	494	603	593	592
Employment Supported in Logging & Primary Timber Processing by Timber Harvest							
Local 1/	4,434 3/	4,000	3,400	2,500	2,800	2,400	2,100
Nonlocal 2/	566 3/	390	340	250	280	250	220

1/ Local signifies employment in logging, sawmills, planing mills, or veneer and plywood mills.

2/ Nonlocal signifies employment created by processing of coarse residues from Jackson-Josephine County mills at a location outside the area.

3/ Data are for 1970.

Source: Wall, Brian R. 1977.

Table 2-18

Estimated Employees per Million Board Feet of Timber Harvested and Processed

	1970-75	1980	1990
Douglas County			
Logging	1.60	1.35	1.22
Sawmills	1.90	1.72	1.52
Veneer & Plywood	3.88	3.57	3.07
Total	7.38	6.44	5.81
Jackson County			
Logging	1.60	1.35	1.22
Sawmills	1.36	1.23	1.09
Veneer & Plywood	4.81	4.40	3.81
Total	7.77	6.98	6.12
Josephine County			
Logging	1.60	1.35	1.22
Sawmills	3.54	3.22	2.84
Veneer & Plywood	1.01	0.92	.80
Total	6.15	5.49	4.86
Klamath County			
Logging	1.60	1.35	1.22
Sawmills	3.30	2.99	2.64
Veneer & Plywood	1.44	1.31	1.14
Total	6.34	5.65	5.00

Source: Based on information presented in Tables 2-16 and 2-19.

Employment multipliers (USDI, BLM [DYRAM] 1978b) for Jackson, Josephine, Douglas and Klamath Counties are 1.844, 2.000, 1.562, and 1.642, respectively. This means, for example, that for every job in Jackson County's lumber and wood products industry there are 0.844 jobs that are indirectly dependent on or are supported by that lumber employment. Thus, between 1974 and 1976 Jackson County averaged 5,060 lumber and wood products jobs in logging, sawmills, veneer and plywood, and supported an estimated 4,270 indirect jobs within Jackson County. The timber industry is therefore estimated to support, directly or indirectly, approximately 20 percent of the jobs within Jackson County.

Due to technological changes, jobs per unit of timber harvested and processed will decline, even with sustained yield policies.

2.17.2 Timber-Based Income

Lumber and wood products earnings from Jackson County amounted to approximately 7 percent of Oregon's lumber and wood products subsector total, and 1 percent of the nation's earnings from lumber and wood products.

Based on an average of 1974-76 covered payroll data, 20 percent of Jackson County's covered payrolls came from lumber and wood products activities while only 11 percent of Oregon's total came from this sector.

In 1976, covered payroll income from logging, sawmills, planing mills, veneer and plywood employment in Jackson County was an estimated $70,411,000. Workers in the timber industry are relatively well paid and wages tend to rise at above-average rates.

Based on an income multiplier of 1.736 (USDI, BLM [DYRAM] 1978b), lumber and wood products payroll income in Jackson County supported another $51,822,000 in income from jobs indirectly related to lumber and wood products. Thus, directly or indirectly, lumber and wood products accounted for approximately $122,233,000 of income to Jackson County.

2.17.3 The Significance of BLM Timber Management

The timber industry in Jackson County is largely dependent on Federal and State agencies for raw materials. According to the Jackson County Economic Development Program (1977), "most firms are 100 percent dependent on the U.S. Forest Service and Bureau of Land Management for their raw materials. ... A few firms have their own timber, but it provides only a small percentage of their total needs."

Table 2-19 displays the 1974 to 1976 annual timber harvest from public lands in the JKSYUs. This log flow analysis indicates where the JKSYUs' timber harvest goes for processing, as well as the volatile nature of harvest patterns.

The log flow analysis and the 1974-76 average harvest-related income contained in Table 2-20 is used in Table 2-21 to illustrate the 1976 personal income and employment dependent on BLM-administered timber in the JKSYUs. The equivalent of 5 percent of Jackson County's employment was tied to JKSYUs' timber. In Josephine, Douglas and Klamath Counties, the dependence on JKSYUs' timber was less. In all four counties combined, an estimated $23.3 million of personal income and the direct and indirect employment equivalent of approximately 1,850 persons were provided by BLM timber from the JKSYUs (Table 2-21).

The 1975 income from cattle and sheep grazing on public lands in the JKSYUs amounted to nearly $131,000, less than 1 percent of the 1975 total market value of agricultural products sold in Jackson County.

In addition, recreational activities on public lands in the SYUs contributed approximately $1,313,000 annually to total personal income (USDI, BLM 1977). Although hunting contributed the most personal income, other major sources included fishing, specific sightseeing, hiking, horse use, ORV use, camping, picnicking, water sports and winter sports.

Overall, the full-time equivalent employment of approximately 1,960 individuals is related to the natural resources of the public lands in the JKSYUs.

2.17.4 Public Revenues

In addition to employment and earnings, timber resources within the JKSYUs supplement local public revenues through the sharing of BLM's O&C receipts with the O&C counties. The 50 percent of O&C receipts that go to the counties increase public revenues and moderate tax levies in several of the counties. It is not uncommon for O&C payments to vary significantly from one year to the next because of changes in the amount of timber harvested and changes in stumpage prices. For example, the 1977 payments showed significant increases over 1976 in both the percent supplement to the levy and the O&C revenue disbursement per $1,000 assessed value (Table 2-22). While O&C payments increased by approximately 80 percent from 1976 to 1977, taxable property assessments increased only 27 percent and tax levies increased by 16 percent for all O&C counties (USDI, BLM 1978a). In 1977, O&C payments totaling $106,045,424 were made to the 18 O&C counties. O&C payments to Jackson County in 1977 totaled $16,617,318, the equivalent of $9.68 per $1,000 assessed value, and accounted for more than 20 percent of Jackson County's total revenue. In fiscal year 1978, however, total O&C payments had declined to $86,289,736.

Table 2-19

Log Flows Analysis,
BLM Sources by Master Unit 1974-76

Log Destination:	1974-76 Average percent	1974-76 Average M bd.ft.	1974 M.bd.ft.	1975 M.bd.ft.	1976 M.bd.ft.
Logs Harvested from Jackson Master Unit					
Medford (Jackson Co.)	67.7	71,050	90,342	48,463	74,347
Ashland (Jackson Co.)	8.8	9,254	9,266	255	18,240
Glendale (Douglas Co.)	6.1	6,376	16,669	-	2,459
Grants Pass (Josephine Co.)	17.4	18,203	18,395	12,994	23,219
Klamath Falls (Klamath Co.)	-	-	-	-	-
TOTAL	100.0	104,883	134,672	61,712	118,265
Logs Harvested from Klamath Master Unit					
Medford (Jackson Co.)	36.1	9,797	13,937	4,027	11,428
Ashland (Jackson Co.)	37.5	10,184	5,890	5,214	19,449
Glendale (Douglas Co.)	-	-	-	-	-
Grants Pass (Josephine Co.)	10.5	2,839	-	4,418	4,099
Klamath Falls (Klamath Co.)	15.9	4,324	4,501	4,010	4,462
TOTAL	100.0	27,144	24,328	17,669	39,438
Logs Harvested from Jackson-Klamath Planning Area					
Medford (Jackson Co.)	61.2	80,848	104,279	52,490	85,775
Ashland (Jackson Co.)	14.7	19,438	15,156	5,469	36,689
Glendale (Douglas Co.)	4.8	6,376	16,669	-	2,459
Grants Pass (Josephine Co.)	15.9	21,042	18,395	17,412	27,318
Klamath Falls (Klamath Co.)	3.3	4,324	4,501	4,010	4,462
TOTAL	100.0	132,028	159,000	79,381	157,703

Source: USDI, BLM, Medford District Office. Jackson-Klamath Planning Area Analysis. 1977.

Table 2-20

Current Employment and Income Related to Timber Harvest from Public Lands in the JKSYUs

	Total Local (Logging, Sawmills & Planing Mills, Veneer & Plywood)	Total Non-Local (Pulp & Paper)
1974-76 Average Annual Timber Harvest	132 (MM Bd. Ft.)	
Direct Employment1/		
Douglas County	50 (Jobs)	
Jackson County	780	
Josephine County	130	
Klamath County	30	
Total Local (Direct Employment)	990	
Total Non-Local (Direct Employment)		120
Local Direct and Indirect Employment		
Douglas Co. (Job Multiplier=1.562)2/	80	
Jackson Co. (Job Multiplier=1.844)2/	1,440	
Josephine Co. (Job Multiplier=2.0)2/	260	
Klamath Co. (Job Multiplier=1.642)2/	50	
Total Local Employment	1,830	
Total Nonlocal Employment		220
Direct Local Personal Income		
Douglas Co. (payroll/employee=$14,120)3/	.8 ($1,000,000)	
Jackson Co. (payroll/employee= 13,560)3/	11.7	
Josephine Co. (payroll/employee= 13,090)3/	1.9	
Klamath Co. (payroll/employee= 14,180)3/	0.4	
Total	14.8	
Total Local Income (Direct and Indirect)		
Douglas County	1.2	
Jackson County	20.4	
Josephine County	3.7	
Klamath County	0.6	
Total	25.9	

1/ Based on percent of timber harvested from JKSYU public lands flowing to various destinations.

2/ Taken from USDI, BLM (DYRAM) 1978b.

3/ 1976 County Average Covered payroll per employee in the lumber and wood products industry.

Table 2-21

Local Personal Income and Employment Related to BLM Resources in the JKSYUs

Occupation Related to BLM Resources in JKSYUs	Personal Income	Full Time Equivalent Employment 1/	Equivalent Dependent Population 2/
Timber	$ 23,287,000	1,850	4,740
Livestock	131,000	10	30
Wildlife-related Recreation	272,000	20	60
Fishery-related Recreation	299,000	20	60
Other Recreation	742,000	60	150
TOTAL	24,731,000	1,960	5,040

1/ Total local income effect ÷ $4,916 (1975 Jackson County income per capita) x .39 (Jackson County labor force per capita).

2/ Total local income effect ÷ $4,916 (1975 Jackson County income per capita).

Source: USDI, BLM, Medford District Office. Jackson-Klamath Planning Area Analysis. 1977.

Table 2-22

O&C Revenue Disbursements Expressed as Property Tax Rate Equivalence and Percent Supplement to Property Tax Levy, O&C Counties, 1976 and 1977

	Tax Rate Equivalence 1/			
	Dollars per $1,000 Assessed Value		Percent Supplement to Levy 2/	
	1976	1977	1976	1977
Benton	$2.31	$3.36	9.1%	21.9%
Clackamas	1.07	1.69	4.0	6.8
Columbia	1.38	2.20	8.9	15.2
Coos	4.14	6.59	16.0	30.9
Curry	8.41	13.27	44.8	120.2
Douglas	9 04	14.47	57.6	90.0
Jackson	6.18	9.78	28.2	50.5
Josephine	12.01	18.23	60.6	119.1
Average for SW Oregon	7.63	12.07	38.0	68.4
Klamath	1.56	2.47	10.5	17.3
Lane	2.53	3.92	10.2	17.1
Lincoln	0.31	0.45	1.8	3.4
Linn	1.13	1.77	5.2	9.4
Marion	0.41	0.62	1.5	2.6
Multnomah	0.08	0.13	0.3	0.5
Polk	2.55	3.91	9.9	16.2
Tillamook	0.94	1.38	5.0	8.2
Washington	0.12	0.19	0.5	0.8
Yamhill	0.69	1.09	2.8	4.9
Average for All O&C Counties	$2.16	$3.01	7.9	13.6

1/ Calculated as follows: O&C payment tax rate equivalency = O&C payment divided by Total true cash value of property (thousands of dollars) --Total true cash value estimates are from: Oregon, State of, Summary of 1977 Assessment Rolls, Department of Revenue, Salem, Oregon, November 10, 1977 and from: Oregon, State of, Oregon Property tax statistics 1976, Dept. of Revenue, Salem, Oregon, 1977.

2/ Calculated as follows: Percent supplement to levy = O&C payment divided by levy of all taxing units within and including the county. Levy estimates are based on Oregon, State of, Telephone inquiry of Mr. Dick Yates, Dept. of Revenue, November 4, 1977 (for 77/78 levy), and the second reference in footnote 1 for the 76/77 levy.

Note: O&C payment for FY 1976 are based on receipts from 7/1/75 to 6/30/76; for FY 1977 the payments are based on receipts from 10/1/76 to 9/30/77.

Source: USDI, BLM. Final Environmental Statement: Josephine Sustained Yield Unit Ten-year Timber Plan. 1978. Table 2-48, p. 2-126

2.18 SOCIAL CONDITIONS

2.18.1 Social Values

Locally, conflicts relating to timber management are common. Generally, intensive timber harvest is favorably viewed by community members whose economic livelihood and security comes from timber harvesting and processing but is seen as potentially harmful by others. These value conflicts are likely to increase in southwest Oregon as more people migrate to the area.

Sixty interviews were conducted in communities within the Jackson and Klamath Sustained Yield Units to identify attitudes and social values which might be affected by BLM actions.

Those interviewed did not answer specific questions but were encouraged to talk about issues of concern to them. The sample size and interview method therefore do not permit precise description of the extent to which specific values are held by the population. Rather, the objective was to indicate which values relating to timber management appear to be shared by many people and which are likely to clash with possible BLM actions. A technical report, containing a detailed description of the methodology and the limitations of the social analysis, is available for review in the Oregon State Office in Portland and the Medford District Office.

2.18.2 General Social Values Applied to the JKSYUs

Within the SYUs, four groups with diverse social values are identified. One group is established in farming and logging. Another includes those long-time residents who moved to the valley to work in the mills or light industry; another is composed primarily of young people who were drawn to southern Oregon in the late 1960′s and early 1970′s to "return to the land". The newest group of arrivals is characterized as financially independent people in search of small town friendliness, good schools, a slower pace of life, cleaner environment, and esthetically pleasing surroundings. The latter two groups generally favor less interference with nature and strongly favor esthetic values over economic values. Alternatively, the established residents who would benefit from economic development (real estate and business interests, logging and light industry) tend to give priority to economic values and favor growth and development. Other less relevant divisions among groups would be between the city dwellers and the rural county residents, or between young people and older, retired people.

Population growth is an example of a controversial public issue. Some see growth as a mixed blessing while others view it as a necessity to economic survival. Other related problems include employment, housing, economic stability, transportation, air quality, and general quality of life. At some point, most of these concerns relate to the timber industry.

2.18.3 Attitudes about Forest Management

There has been an increasing concern about the stability of the timber industry, its corresponding local economic impacts, and forest management practices on private and public lands.

As the old-growth timber resources are depleted, demands on BLM to manage timber in such a way as to ensure the health of the timber industry, local job market, and tax revenues may be in direct conflict with the demands of nonconsumptive users. Some of these contrasts have surfaced in a series of public meetings held by the BLM in selected communities. Written comments submitted at these meetings show moderate agreement over the following issues:

- Providing free access to BLM roads
- Continuing grazing
- Protecting wildlife
- Regenerating forests
- Protecting air and water quality
- Making wood available for firewood cutting
- Becoming involved with salvage harvesting
- Permitting mining
- Controlling motorized vehicles
- Becoming involved in precommercial thinning

Issues that did not seem to show community agreement were:

- Whether to increase recreation on public lands
- Whether to increase the BLM staff
- Whether to build new roads
- Whether to use herbicides
- Whether to do more clearcutting
- Whether to sustain current harvest levels or increase harvest levels

Except for the issue of clearcutting, county-wide interviews indicate similar preferences and disagreements. They reaffirm support for reforestation, precommercial thinning, increased availability of firewood, protection of wildlife, and increased salvage harvest. The areas of disagreement were over the use of herbicides and fertilizers, recreational developments, harvest cutbacks, and road building. While the interviews suggest that most people oppose clearcutting, comments received by the BLM at their meetings indicated that clearcutting is favored by others.

On a broader scale, most of the interviewees have been unhappy with Federal agencies for diverse reasons including concern about watershed quality, the use of herbicides, loss of wildlife in the forests, or the loss of grazing privileges. In addition, a number of respondents employed in or working with the timber industry expressed a concern over the deficiency of knowledge regarding forest practices in southern Oregon, while others advocated intensified forest management practices which have been applied to private land but have received only limited use by BLM.

Critics of the use of chemical fertilizers and herbicides fear that dependence on chemicals causes weak trees, possible hazards to wildlife, and misuse of scarce fossil fuels. However, only a minority of the people interviewed focused on the effects of dioxin in relation to their overall concern about herbicides. It is noteworthy that different communities reacted differently to these issues. For example, those interviewed in the Keno area generally expressed concern about the harmful effects of roads on wildlife, but favored the use of herbicides and fertilizers, whereas those from the Applegate area generally opposed herbicides.

In general, the local public seems to appreciate BLM roads and the access for recreation and esthetic enjoyment of the woods. However, even recreationists are not in agreement. Hunters tend to be concerned about too many roads while anglers want more access. Some believe wilderness preservation is necessary even at the cost of limiting recreation use while others demand more access and campground facilities. A number of people complained that campgrounds were too developed.

2.18.4 Attitudes About Economic Stability and Employment

There is a concern throughout the community that the economic base of Jackson County depends too much on the timber industry to maintain economic stability. Many residents feel a need for more and faster economic diversification. Some people feel it is almost impossible to establish new industry in the area because of excessive government regulation; others cite high taxes and the poor attitude of residents as the cause. For example, Ashland residents in particular are accused of blocking the establishment of new industry because of concerns over traffic, noise and air pollution.

In some towns (Ashland and Rogue River) growth appears to stem primarily from incoming retirees and local economies are based primarily on services, although a few timber-related industries remain. In other towns, such as Butte Falls, employment is dominated by timber harvesting. In general, employment opportunities are thought to be insufficient and jobs are thought to be poorly distributed in relation to the labor force.

Residents are concerned that there is an inadequate local job market. Unemployment among migrant workers also contributes to housing and social service problems.

2.18.5 Attitudes About Government Agencies and Governmental Regulations

Generally, residents agree that government agencies have too much influence over local conditions and treat local input as irrelevant. Although those who use the forest primarily for esthetic or recreational enjoyment were most likely to hold such views, respondents working in forestry related jobs also felt that the BLM was unresponsive to local needs, but for different reasons. They felt that the BLM was far too responsive to large environmental groups.

3

CHAPTER 3

Impacts of the Proposed Action

3

3. IMPACTS OF THE PROPOSED ACTION

This chapter is an analysis of the significant impacts of the proposed action upon the various resources as they exist today (described in Chapter 2). Analysis indicates that there would be no significant impacts upon climate, geology, topography, mining, agriculture, rural and urban lands, and transportation. Two categories of operations are involved: those required for harvest, and those required for the assurance and augmentation of future timber crops. The operations are defined in the Glossary.

The 3-year (1980-82) timber sale plan (Appendix A) is used where applicable for site specific timber sale impacts. The plan contains estimates of volume to be harvested, types of logging methods to be used, miles of roads to be constructed, acres of slash to be burned, and soil association types to be affected within each sale area. All other timber management practices listed in Table 1-1 can only be analyzed from the 10-year timber management plan. Tree planting, precommercial thinning, fertilization and gopher control projects would be developed and undertaken throughout the 10-year period based on identified needs.

Comparison of the 3-year timber sale plan to the 10-year proposed harvest level discloses significant average annual differences. Approximately 80 percent of the total overstory removal planned for the decade would be accomplished in the first 3 years. Conversely, only 8 percent of the final harvest and 10 percent of the commercial thinning sales would be accomplished in the first 3 years. An analysis of impacts for years 4 through 10 assumed that levels of the above three types of harvest would adjust to reflect the proposed decadal harvest level. Specific sale sites for fiscal years 1983 through 1989 are unknown.

A 1-year herbicide plan has also been prepared for the JKSYUs and is outlined in Appendix B. This is the fiscal year 1979 plan which is not fully representative since no spring spraying was accomplished. Since no herbicide use has been allowed for the past 3 years, a typical plan would show greater emphasis on removal of the backlog in site preparation and release applications. It is expected that the bulk of the backlog will be removed by the middle of the decade. The total area proposed for herbicide treatment is 29,690 acres as shown in Table 1-1.

Within the indicated constraints, timber sale and herbicide plans provide a means to quantify some of the treatments listed in Table 1-1 and facilitate impact analysis in this chapter.

The format of the analysis is similar to the format of Chapter 2 in that impacts are described under resource component headings. A brief summary of impacts is provided with each major resource section. A tabular display of impacts, quantified to the extent possible, is also provided where appropriate. The degree of impact is determined by differences in impact intensity between the proposed plan and the existing plan (Section 1.6). Secondary impacts are identified and traced to the extent they can no longer be identified with the proposed action.

Two time frames are used in the analysis process. The short term is the first 10 years, the planned life of the proposed timber management plan. The long term is defined as in excess of 10 years. It is expected to take 50 years before all old growth is removed from commercial forest lands in the intensive management category. Other discrete time periods, pertinent to specific impact discussions, are used as necessary and are identified in the text.

A basic assumption of the analysis is that sufficient funding and manpower will be available for implementing the management plan as proposed. Because in many cases existing levels of resource data are limited and specific sites for proposed timber management activities are not presently known for the 10-year plan period, both "most probable case" and "worst case" assessments are addressed in this chapter. It is further assumed that the herbicide projects proposed are submitted through an annual Departmental review process (described in Section 1.3.4.2) each year prior to approval of any project.

3.1 IMPACTS ON CLIMATE

All impacts of the management plan are to the microclimate rather than the climate of the JKSYUs. As a result of timber harvest, road construction, and development practices, soil temperature extremes would increase, relative humidity would decrease, and wind velocities would increase. Seedling mortality would increase somewhat as a result of such changes, although not a significant amount. Understory vegetation would tend to dry out more quickly in the dry season, which would be of significance during periods of fire danger. Loss of timber from windthrow would be insignificant since most of blowdown would be salvaged.

3.2 IMPACTS ON AIR QUALITY

Air quality would be significantly impacted by increased particulates produced during slash burning. To assess the impacts of slash burning on air quality in the JKSYUs the following assumptions were made:

(1) Project design features in Section 1.3.3.2 would be applied; that is, burning would not be allowed during periods of high air pollution and air stagnation.

(2) Burning would occur only with permission from the Oregon State Department of Forestry. In 1978 about 75 percent of planned burns were conducted in Jackson County (Oregon Department of Forestry 1979).

(3) Burning may occur throughout the year.

(4) All other factors contributing to air pollution in the JKSYUs would occur uniformly over the Southwest Oregon Air Quality Control Region.

(5) Emissions from slash burning would be uniformly distributed over the JKSYUs.

Essentially no slash burning has been done on the planning area over the past 5 years to October 1, 1977 (BLM File Data, OSO), and it is assumed that there would be no slash burning until the start of the proposal. Consequently, the proposed action represents an increase from no burning to 23,700 acres of burning over the 10-year time period, an average of 2,370 acres per year.

After considering the amount of slash produced in forests of western Oregon, the type of timber that would be cut, the geographic location, the age of most of the trees, and the average reported ratios of weight to slash volume, the average weight of slash that would be burned annually was calculated to be 150 million pounds (75,000 tons) (Maxwell et al. 1976; Howard 1971; Dell et al. 1971).

Certain combustion products, including particulates, nitrogen oxides, carbon monoxides, and hydrocarbons, are used as indicators of air pollution from slash burning. The amount of each pollutant produced per ton of slash burned and the total amount that would be produced over 10 years by the proposed action is shown in Table 3-1. Approximately 26 percent of these pollutants would be produced in the first 3 years of the proposed action.

Since pollution from burning forest vegetation (wild fire and controlled burning) accounts for 57 percent of the area-source particulate pollution in the AQCR (ODEQ 1976a), the burning of slash is rightly of concern.

The amounts of additional pollutants produced from slash burning would most likely be mixed by wind and dispersed (Table 3-1). Under the assumed management guidelines, no burning would be done on days when there was no atmopheric mixing or movement, thus the smoke would dissipate and reach background levels after traveling between 12 to 30 or 35 miles (Fritschen et al. 1970; U.S. EPA 1978).

Carbon monoxide production would increase but because concentrations drop rapidly with distance from the site (Fritschen et al. 1970), levels would not increase significantly throughout the planning area. Although burning would be controlled to minimize impacts, the increase in particulates would be significant in the JKSYUs. The effects of increased particulates would be reduced visibility in the area of the burn with subsequent impacts to esthetic values, as well as possible aggravation of chronic lung and heart diseases. Although the areas most affected by increased particulates are not heavily populated, residents and recreationists have come to expect higher air quality there than in urban areas and would be unfavorably affected. In attempting to keep smoke out of the heavily populated Bear Creek Valley, it would seem likely that visibility within Crater Lake National Park or other non-populated Class I areas would be adversely impacted by the slash burning proposed in the JKSYUs.

Because neither the exact location of the proposed burns nor the time when the Oregon State Department of Forestry would allow burning is known, it

Table 3-1

Potential Air Pollution Caused by Slash Burning in the Proposal Area

Amount of slash that would be burned/year	Pollutant produced by burning slash	Weight of pollutant produced per ton of slash burned 1/ (lbs/ton)	Calculated weight of pollutant produced by the proposal each year (tons)	Total annual weight of pollutant from slash burning-1977 (tons/yr)	Total annual weight of pollutant from all sources 1977 2/ (tons/yr)	Percent additional pollutant from proposed action compared to that presently produced by slash burning	Percent additional pollutant from proposed slash burning (compared to all sources)
75,000 tons	particulates	17-67	635-2,500	1,130	4,520	56-220	14-55
	carbon monoxide	20-500	750-18,750	8,010	33,300	9-234	2-56
	hydrocarbons (as carbon)	10-40	375-1,500	-	no data	-	-
	oxides of nitrogen	2-6	75-225	250	6,262	30-90	1-4

1/ U.S. EPA 1978
2/ ODEQ 1976b (tons of pollutant/year X $\frac{\text{area JKSYUs}}{\text{area AQCR}}$)

is not possible to determine the increased frequency of violations of air quality standards as a result of slash burning.

3.3 IMPACTS ON SOILS

3.3.1 Erosion

The major source of soil erosion under the proposed action is from construction of new roads. Other minor sources which add up to a significant amount of erosion include yarding activities and slash disposal. Other management activities were found to cause little or no additional amounts of soil erosion. Planting would significantly reduce soil erosion on previously understocked areas.

3.3.1.1 Road Construction and Maintenance

Forest roads have been recognized as the major cause of erosion resulting from silvicultural activities and of soil movement and stream siltation in western Oregon (Fredriksen 1970; U.S. EPA 1975; USDI, BLM 1959).

An estimated 375 miles of new permanent road would be constructed on 1,770 acres of relatively undisturbed lands. The erosion rate for the undisturbed lands in the JKSYUs is 35 tons per square mile per year (0.05 tons/acre/year) (Section 2.4). Construction of logging roads would increase erosion 220 times this figure (Megahan 1972), to 12.0 tons per acre per year, decreasing at a rate of 25 percent per year for 4 years to background levels. The total erosion due to new road construction would equal approximately 53,100 tons over the decade.

The number of miles of road requiring reconstruction and renovation would vary from year to year because factors such as the degree and intensity of use, extreme weather, and normal weather determine the need for reconstruction. Impacts of reconstruction activities are often similar to those of construction, although no new roads are added to the system. Based on an estimated 100 miles of reconstruction and maintenance, approximately 7,500 tons would erode over the 10-year period of the proposed action.

Analysis of the 3-year timber sale plan shows some construction of roads on unstable soils. Project design features would be used on these soils to minimize erosion losses, but if they should fail, considerable soil erosion could occur. Table 3-2 indicates those sales where road failure could result in significant soil erosion. Because of lack of research in this region, it is not possible to quantify soil losses on a site-specific basis.

3.3.1.2 Yarding

Yarding increases erosion by disturbing and/or compacting the surface layers of soil. Tractor yarding would disturb and/or compact 13,625 acres (Table

Table 3-2

Sales with Soil Erosion Problems

Soils	Problems for road-building	Sales involving road-building on unstable soils 1980 Sales	1981 Sales	1982 Sales
370	Slumping onto roadways-massive slides may occur when saturated	80-12 80-19	81-12	82-16 82-17 82-20 82-21
382	Mantle stability reduced with excavation-some landslides where deep cuts			82-20
706	Cutbank unstable-sloughing common-highly erosive		81-3 81-12	82-2
710	Cutbanks unstable, with continuous sloughing-strong colloidal source			82-2
721	Cutbanks and fills subject to slumping and massive landslides-highly erosive	80-21	81-1 81-19	
722	Cutbanks and fills subject to slumping and massive landslides-highly erosive	80-21		
840	Cutbanks slump and ravel-small slumps trigger larger slides-highly erosive	80-1 80-2 80-3		82-2 82-5
842	Cutbanks slump and ravel-small slumps trigger larger slides-highly erosive			82-2 82-3
850	Cutbanks unstable-highly erosive			82-3
861	Cutbanks and fills subject to slumping and massive failure when saturated		81-1	

3-3). Present undisturbed erosion rates on these lands is 35 tons per square mile per year. Tractor yarding would increase annual surface erosion rates 1.6 times (Megahan 1972), to 56 tons per square mile per year. Therefore, an additional 1,120 tons of soil would erode over the 4 years needed for the area to return to pre-yarding erosion levels. Approximately 17,775 acres would be disturbed and compacted by cable yarding (Table 3-3). A total of 1,460 additional tons would erode over the 4 years required to return to pre-yarding erosion levels.

Table 3-3

Soil Disturbance and Compaction Attributable to Yarding - Worst Case Analysis

Type of System and Harvest	Acres Yarded	Percent of Yarded Acres Disturbed	Total Acres Dist.	Percent of Yarded Acres Compacted	Total Acres Comp.
Tractor Systems					
Timber Harvest	20,685	36%	7,445	26%	5,380
Commercial Thinning	5,329	10%	535	5%	265
Subtotal	26,014		7,980		5,645
Cable Systems					
Harvest	39,315	31%	12,190	9%	3,540
Commercial Thinning	9,896	10%	990	5%	495
Subtotal	49,211		13,180		4,035
Totals	75,225		21,160		9,680

Source: U.S. EPA 1973a

Analysis of the 3-year timber sale plan shows that several sales are being planned on problem soils discussed in Section 2.4. The following sales lie partly or wholly upon unstable clayey soils: 80-1, 80-2, 80-3, 80-12, 80-17, 81-3, 81-12, 81-13, 81-15, 81-16, 82-2, 82-3 and 82-15. Slumping and/or mass failure of these soils could result in considerable soil erosion. Sales 80-19, 80-21, 81-19, 82-17 and 82-21 are planned on erosive granitic soils that have high erosion potential. Landslides and slumps may occur. On both types of sales, project design features and district specialists' recommendations would be used to minimize the possibility of failure. For further information on specific methods used to minimize the chance of landslides and/or slumps on unstable soils, see Appendix D, subsections E, F, K, O and P.

3.3.1.3 Slash Disposal

Slash disposal would involve gross yarding and/or slash burning on 56,700 acres. Gross yarding would compact and disturb about 30 percent of the area treated, or 9,900 acres. Since erosion rates would be similar to those following tractor yarding, an additional 975 tons of soil would erode over the 5 years needed to stabilize the areas. Slash burning, by removing protective

vegetation and litter, would increase surface erosion, and if sufficiently hot, could cause surface soil structure to break down and reduce organic matter content (U.S. EPA 1976b). An estimated 5 to 8 percent of the areas, or 1,900 acres, would be severely burned (Tarrant 1956; Dyrness et al. 1957 Cited in U.S. EPA 1976b). Since burning would increase erosion by approximately one-half that of tractor yarding, about 90 additional tons of soil would erode over the 5 years needed to revegetate and stabilize.

3.3.1.4 Planting

Planting burned, nonstocked, and poorly stocked areas would reduce long-term erosion losses and improve water infiltration in areas with poor vegetation cover (USDA, FS 1978). As cover increases, soil erosion decreases, since cover prevents spatter erosion and surface compaction by raindrops (Lull 1959).

Tree seedlings would hold more soil moisture through the dry season (June through September) and therefore reduce dry raveling (movement of soil downslope). More root penetration on steep slopes would increase slope stability and reduce chances of mass failure (Burroughs et al. 1976).

3.3.2 Soil Productivity

Soil productivity would be adversely affected by compaction resulting from yarding after timber harvest and thinning operations, and beneficially impacted by fertilization. Nutrients would be lost from the forest ecosystem as a result of timber harvesting, thinning, slash burning, and perhaps herbicide application (there is a lack of pertinent research on the latter), but amounts would be small in terms of the total amount of nutrients in the forest ecosystem (Sopper 1975), and site productivity would not be reduced significantly by losses. Impacts of these nutrient losses on water quality are discussed in Section 3.4.2. Other management activities would have insignificant impacts on soil productivity.

3.3.2.1 Yarding

Compaction would reduce soil productivity and result in reduced timber volume. About 9,700 acres would be compacted by yarding after timber harvest and commercial thinning (Table 3-3). The severely compacted areas (about 12 percent) would be ripped, leaving about 6,700 acres that would be impacted by compaction. Soil compaction has been shown to reduce timber growth 14.8 percent (Froehlich 1978). This reduction would be a significant adverse impact. Those soils not ripped would likely take 35 to 40 years to recover.

3.3.2.2 Fertilization

The proposed action would apply 200 pounds of nitrogen per acre, primarily in the form of urea pellets. Over the 10-year period, 2,320 tons of nitrogen

would be applied to 23,185 acres. Fertilization with nitrogen would impact soil productivity beneficially because nitrogen is not only the nutrient most susceptible to loss from the forest ecosystem, but is also most likely to limit maximum growth in the forest (Moore et al. 1974).

The effects of increased nitrogen in the forest ecosystem would be to make the soils more acid, increase the rate of decomposition, and increase the solubility of organic matter. Little is known about the effect of nitrogen on the recycling rates of other nutrients in forest soils. The impact of an increase in the nitrogen content of the forest soil would be to increase the rate of growth of all plants in the ecosystem, including weeds, brush, microbes and trees.

3.3.2.3 Conclusions

About 64,000 tons of soil would erode as a result of the proposed management plan. By way of comparison, an acre of soil 1 inch deep weighs between 125 and 200 tons, depending on soil texture. The impacts of this soil erosion over the whole of the JKSYUs would be site-specific and vary in degree of significance. Loss of topsoil from low-fertility sites would impact soil productivity significantly and adversely. Some of this eroded soil would reach waterways and increase sediment yield (Section 3.4.2.1).

Soil productivity would be adversely and significantly affected on 6,700 acres by compaction from yarding after timber harvest and commercial thinning, and would not be expected to recover naturally for 35 to 40 years. Fertilization would improve site productivity significantly on treated areas and result in increased vegetative cover. This would subsequently reduce soil erosion and water yield from these areas.

3.4 IMPACTS ON WATER RESOURCES

3.4.1 Water Yield

Water yield would increase from those lands disturbed by commercial thinning, shelterwood and clearcut harvest, slash disposal, yarding and road construction, and would be reduced by fertilization and planting. Other management practices would have insignificant effects. Table 3-4 shows the acreage proposed for treatment annually and the resulting increase in yield from these treatments. Since fewer acres would be affected under the proposed action than have been in the last 5 years, the increase in water yield caused by the disturbance would not be as great. The increased water yield as a result of treatments under the proposed action would be 4,500 acre-feet per year, assuming water yield from relatively undisturbed lands in equilibrium is 2.5 acre-feet per acre per year.

Table 3-4

Water Yield

Treatment	Acreage Treated Under Proposed Action (per year)	Acreage Treated Under Present Harvest Plan (Annual Average Of Fiscal Years 1972 to 1977 From Table 2-20)	Percent Change in Water Yield From Individual Sites Following Treatment	Increase in Yield From Disturbed Areas Under Proposed Action (Acre-feet/Year)	Increase in Yield From Disturbed Areas Under Present Action (Acre-feet/Year)
Harvest					
Clearcut	400	465	+40 1/	400	465
Shelterwood	6,000	13,271	+25 1/	3,750	8,295
Single Tree Selective Cut	90	0	+ 8	20	0
Commercial Thinning	1,525	64	+25	955	40
Yarding	3,085	6,560 2/	+10	770	1,640
Transportation System					
New Roads	177	468	+20	90	235
Reconstructed Roads	10	43	+10	5	10
Surfaced Roads	5	0	+20	5	0
Development and Protection Practices					
Slash Disposal	5,670	2,915	affects 30% of treated area; yield increased 10%	425	220
Mechanical Scarification	2,230	47	slight reduction	-	-
Chemical Vegetation Control	2,850	87	slight increase	-	-
Planting	5,380	1,017	-10	-1,345	-255
Precommercial Thinning	795	125	no significant change 3/	-	-
Fertilization	2,320	13	-10	-580	-5
Total	30,537	25,075		4,500	10,650

1/ Derived from Harr 1976
2/ Acreage calculated using same method as in Table 3-3
3/ U.S. EPA 1976a

3.4.2 Water Quality

Increased sediment yield as a result of the proposal would not have a significant impact on the whole of the JKSYUs, but could have significant adverse impacts on water quality in localized areas, particularly small stream reaches. Those activities which would impact small streams include yarding, road construction, slash disposal, and mechanical scarification. Other phases of the management plan would not significantly increase sediment yield. Harvest by clearcutting and shelterwood methods, and slash burning would enrich streams with nitrogen and other nutrients. Impacts of herbicide treatment upon water quality would not be significant if all design features were successful.

3.4.2.1 Sediment Yield

Sediment yield of forest lands is estimated at 150 tons per square mile per year based on the average sediment yield of other sites in western Oregon (Fredriksen 1970). Areas disturbed by yarding practices would produce 1.6 times the average sediment yield for the JKSYUs (Megahan 1972) or 240 tons per square mile per year. The 21,160 acres disturbed by tractor and cable yarding under the proposed action would yield an additional 8,925 tons of sediment over the 5 years needed to return to undisturbed levels.

Sediment yield from the 1,770 acres disturbed by road construction would triple over present yields in the first year after road construction (Brown et al. 1971 In U.S. EPA 1973a). This would be an average for the first year, as sediment yield may increase 250 times following the first storm event after construction (Fredriksen 1965). This means initial sediment yield would increase by 830 tons. Within 5 years, the new roads would stabilize and produce only one-third more sediment than undisturbed forest lands. Total sediment yield for the first 5 years following road construction would be 2,900 tons.

Reconstruction of 100 miles of road would increase sediment yield to levels approximately two-thirds that of newly constructed roads, or 300 tons per square mile. Over the 5 years needed to reach "stable" yields (200 tons/square mile) approximately 825 tons of sediment would enter streams as a result of reconstruction.

Surfacing 50 miles of road would eventually reduce sediment yield. Initially, however, sediment yield would probably increase by the same amounts as in reconstruction. Within 5 years, yields would decline to that of undisturbed forest lands as a result of surfacing. Therefore, approximately 310 tons of additional sediment would be produced over 5 years after surfacing.

Gross yarding would increase sediment yield by an average 24 tons per square mile on about 30 percent of the lands compacted and disturbed by the activity. Sediment yield from these disturbed lands would increase 1,115 tons over the 5 years needed to return to undisturbed levels.

Extremely hot slash fires destroy vegetation and litter which protect the soil surface. This, rather than changes in the actual mineral soil, is the most important impact of fire (U.S. EPA 1976a). Severely burned areas (all litter and vegetation destroyed) account for a very small portion of the total burn (from less than 3 to 8 percent) (Dyrness et al. 1957; Tarrant 1956), but contribute most of the sediment produced after a burn. At present it is not known how much sediment is produced by broadcast burning, but it would be only a small amount when compared to roads and yarding (Fredriksen 1972).

Mechanical scarification would increase sediment yield on treated areas 10 percent over the average rate of the planning area, or 15 tons per square mile. This means the sediment yield from 22,300 acres would increase 1,575 tons in the 5 years before the areas once again stabilized. This could have slight adverse impacts on water quality of streams immediately adjacent to the areas being scarified.

Analysis of the 3-year timber sale plan showed seven sales where increased sediment yield from logging activities could impact streams that already have a severe sediment problem and/or severe stream bank erosion problems. These sales include 80-13, 80-20, 80-22, 81-17, 81-19, 81-21 and 82-17. In addition, failure of slopes of those sales discussed in Section 3.3.1 (Yarding subsection) and/or of roads in those sales listed in Table 3-2 could increase sediment yield of adjacent streams somewhat. Because of the lack of research in southwestern Oregon forests, however, quantification of increased sediment yield on a site-specific basis is not possible.

3.4.2.2 Chemical Quality

The quality of runoff water from lands subject to timber harvest would be affected by the release of nutrients from the soil (see Chapter 2, Soils). Nitrogen is the element of most concern since it is very mobile and may cause eutrophication of water bodies (Tarrant et al. 1969 Cited in Anderson et al. 1976).

An estimated 0.16 pounds of nitrogen per acre would enter streams as a result of clearcutting and 0.05 pounds per acre after shelterwood harvest (Calculated from U.S. EPA 1976a; DeByle et al. 1972 Cited in Sopper 1975).

A total of 9,015 pounds of nitrogen would be lost to runoff in the 5 years needed to reestablish nutrient cycles. Assuming a natural discharge rate from studies of 16 pounds per acre over 4 years (Cole et al. 1967 Cited in Moore et al. 1974 In Cramer 1974), this would be an increase of about 1.3 percent over the natural discharge. Nitrogen losses would of minor short-term significance for both terrestrial and aquatic systems (Brown 1972; U.S. EPA 1976a).

Fertilization would likely increase nitrogen concentration in streams. The typical reaction of a watershed to fertilization would be a urea concentration peak in the runoff water within a few hours of fertilizer application. Following this peak (over a period of a few days), there would be a smaller

ammonia peak, and a few days later, a smaller nitrate peak. The nitrogen from the fertilizer application would fall to background levels after a few weeks.

Most of the fertilizer loss would occur from November through January in runoff. Levels of nitrogen in streams draining one watershed in southwest Oregon that had been fertilized with nitrogen have not exceeded Federal public health standards as a result of fertilizer application alone. Impacts to the water quality of streams of the planning area would be expected to exhibit similar responses as observed in studies in western Oregon and Washington (Fredriksen et al. 1973). Quantification, however, is not possible since dilution factors, time of application and the total annual yield for the water year involved in such calculations all vary. Impacts of fertilizers on water quality would not be expected to be significant.

Slash burning accelerates the release of chemicals, some of which reach streams and influence water quality (Rothacher et al. 1974 In Cramer 1974). It is assumed for this analysis that the increased loss of nitrogen would be equal to that from clearcutting. Therefore, 3,800 pounds of nitrogen would be lost the first year after burning, and a total of 11,400 pounds over the 5 years before losses were minimized by regrowth.

The other elements of concern (phosphorous, potassium, calcium and magnesium) would not increase in the total runoff from the JKSYUs to any significant extent following harvest. Losses would occur when the mineralized elements were leached out of the soil.

The adverse impacts of nutrient enrichment of streams would be site specific immediately downslope from the activity and would vary in intensity, depending upon degree of disturbance upslope and to stream channels. Because only acreage and not actual burn sites were identified for each sale in the 3-year timber sale plan, site-specific analysis is not possible. Approximately one-fourth of the planned burns are scheduled in the first 3 years.

Levno and Rothacher (1969) showed that broadcast slash burning increased summer water temperatures in some western Oregon streams by as much as 14oF above that caused by harvesting. This was a result of removing shading vegetation from the watershed. Impacts from slash burning on stream temperatures could be significant on small stream reaches and have adverse impacts upon the fisheries in the JKSYUs only if streamside vegetation is accidentally burned.

There are approximately 765 miles of Class I streams within the JKSYUs, approximately 195 miles of which are on public lands. Water quality could be impacted by herbicides by rapid overland flow of water from roads or other compacted areas, treatment of adjacent riparian zone vegetation, or by accidental application directly on the water surface.

The herbicides are proposed to be used in a manner that minimizes the possibilities for water contamination. These project design features are described briefly in Chapter 1. All the herbicides listed in the proposed action could

have some short-term impacts on water quality. Available information indicates that although some 2,4-D may enter those streams flowing through or adjacent to areas being sprayed, the levels in the streams would be very low. In monitoring spray operations, scientists did not find 2,4-D residues exceeding 0.05 parts per billion in the South Umpqua or Rogue Rivers (Table 3-6). In western Oregon streams, monitoring over 6 years never showed residues of 2,4-D that exceeded 0.1 parts per million. The length of persistence (usually a few hours, but up to a few days) was a function of the hydrologic nature of the area treated. These concentrations are far below the recommended limit for 2,4-D, atrazine, and dalapon in potable water supply sources. While limits for Krenite and Roundup have not been established, the recommended safety limits set for 2,4-D, atrazine, and dalapon in potable water are as follows:

2,4-D	0.02 mg/l	(U.S. EPA 1973b)
atrazine	0.03 ppm	(U.S. EPA 1977)
dalapon	0.1 ppm	(U.S. EPA 1977)

Generally, groundwater supplies would not be impacted unless spraying was done on or near wetlands (areas with high water table). Long-term, low-level pollution would be found if 2,4-D were accidentally applied directly on marshy areas (USDA, FS 1975), but these areas would be quite small and isolated. Large marshy areas would be identified and project design features (Section 1.3.4.2) would be applied to them.

Potential impacts of herbicides on water quality are identified and described in the environmental statement prepared by BLM on the spraying program for western Oregon (USDI, BLM 1978d). Some herbicide traces (a few parts per billion) could appear for a short period in nearly all streams which flow immediately adjacent or through treatment areas only if there were no buffer zone. Potential also exists for contamination of water due to the erosion of soil particles containing herbicides and from leaching in shallow, stony, rapidly drained soils. However, studies have shown that since nearly all the herbicides found in streams were introduced by direct application of spray materials to the surface of the water, careful application should mean that impacts of herbicide application on water quality would be insignificant.

Table 3-5 contains a summary of the characteristics of herbicides proposed for use in the planning area. Extensive monitoring of present-day operational applications of herbicide in forests show most applications do not result in high concentrations of herbicide in nearby streams. Field results in the Coos Bay District where silvex and 2,4-D were applied in 1977 indicated that of the 11 representative streams in the 12,253-acre project which were selected to be intensively monitored, 9 were found to contain amounts of herbicide ranging from less than 0.001 ppm to 0.012 ppm of 2,4-D and less than 0.001 ppm to 0.005 ppm of silvex at some point within a 72-hour period. These streams were all protected with buffer strips (Cameron and Anderson 1977).

Monitoring results from the mainstems of the Rogue and South Umpqua Rivers are shown in Table 3-6. They show virtually no detectable level of herbicides.

Table 3-5

Summary of Characteristics of Herbicides Used In Forestry

Herbicide	Formulation	Season of Application	Carrier and Volume	Application Rate	Selectivity	Relative Persistence	Use Precautions	Route of Uptake	Cost ($/lb or $/gal)
2,4-D	Amine	Spring and summer	None	Undiluted or 1:1 with water 4 lbs. ai/A	Hardwoods except cherry and bigleaf maple by injection	Short	LD_{50}-375 mg/kg	Cut surface	$6.50 gal. at 4 lbs. ae/gal.
	Low volatile esters (isooctyl, BOE, PGBE)	Late winter to summer	5-20 gal/A in diesel, water or oil-in-water	1/4-3/4 gal/A 1/3 bl ae/A	Shrubs, weed trees and forbs; for site preparation and conifer release (except pines)	Short		Stem & foliage	$8/gal at 4 lbs. ae/gal.
	Amine	Spring to late summer	None	Undiluted or 1:1 with water	Hardwoods by injection	Short		Cut Surface	$19/gal at 4 lbs. ae/gal
Dalapon	74% sodium and magnesium salts-water soluble	Late winter to early spring after grasses emerge	5 to 10 gal/A areal; 10 to 100 gal/A ground in water	3 to 11 lbs. ai/A	Annual and perennial grasses for site preparation use with Atrazine or directed sprays for release	Short	Use 1/2 to 4 pints surfactant per 100 gal; delay planting 2 weeks if rate over 8 lbs.; apply when grasses are actively growing; LD_{50}-6500 mg/kg	Foliage & root	$1.96/lb.

Table 3-5 (Concluded)

Herbicide	Formulation	Season of Application	Carrier and Volume	Application Rate	Selectivity	Relative Persistence	Use Precautions	Route of Uptake	Cost ($/lb or $/gal)
Atrazine	80% wettable powder	Late winter	10 gal/A in water	3 to 4 lbs. ai/A	Annual grasses and some forbs; does not damage conifers when properly applied.	Short	Requires at least 2 inches of rain after application; LD_{50}-3080 mg/kg	Root	$2.80/lb
Krenite AECP (Ammonuim ethyl carbamoylphosphonate)	Krenite-water soluble liquid	Late summer to early fall	10-40 gal/A aerial; 50-300 gal/A ground in water	1-1/2 to 3 gal/A 6 to 12 lbs. ai/A	Deciduous species for site preparation	Short	Applied in 2 month period before fall leaf coloration; LD_{50}1/: 24,000 mg/kg	Foliage	$32/gal
Roundup	Water soluble	Spring, fall	10 gal/A in water	1 qt. to 1 gal.	Deciduous trees, shrubs, weeds	Short	Apply only to undisturbed areas	Roots	$50-$60/gal.

Short = 1/2 life 4 months; moderate = 1/2 life 5-8 months; long = 1/2 life 8-12 months.
ae = acid equivalent; ai = active ingredient.
Season of application may vary depending upon local conditions.
1/ LD_{50} = a standard measure of toxicity; the lethal dosage rate of a substance that will kill 50 percent of a group of experimental organisms.

Table 3-6

Results of Herbicide Monitoring in South Umpqua and Rogue Rivers

Herbicide Analyses, integrated flow

	Total 2,4-D (ppb)1/	Total Atrazine (ppb)
Station No. 14312260 South Umpqua River near Roseburg, Oregon		
Oct 22, 75	.00	—
Jan 22, 76	.00	—
Apr 16, 76	.00	—
Jul 22, 76	.01	—
Oct 20, 76	.00	—
Jan 6, 77	.00	—
Apr 20, 77	.00	—
Jul 26, 77	.05	—
Station No. 14372300 Rogue River Near Agness, Oregon		
May 20, 76	none2/	none
Aug 18, 76	none	none
Nov 17, 76	none	none
Feb 24, 77	none	none
May 17, 77	none	none
Aug 24, 77	none	none

Herbicide Analyses, bottom sediment material

	Total 2,4-D (ug/kg)	Total Atrazine (ug/kg)
Station No. 14372300 Rogue River Near Agness, Oregon		
May 20, 76	none	none

1/ The source (USGS) reported these values in micro grams per liter (ug/L) rather than parts per billion (ppb). The two values are essentially the same at these small concentrations.

2/ None signifies specifically looked for but not detected.

Source: Computer printout from the U.S. Geological Survey "WATSTORE" system for western Oregon.

3.4.2.3 Conclusions

Increase in water yield from the 30,500 acres treated under the proposed action would be 4,500 acre-feet per year. This increase would occur on individual watersheds and could have significant adverse effects, especially on smaller stream reaches. The velocity of streamflow would increase causing some additional erosion (personal communication, Harr 1978). Road construction would also cause an increase in average peak flows following the first major storm of the season. Major peak flows would not change significantly since they normally occur in winter months when the soil is saturated (Rothacher 1973). Absolute increases in minimum streamflow would be small, but the relative change would be significant (Harr 1976b).

The annual water yield from BLM-administered lands would be less than the past 5 years as a result of the proposed action, and total yield would decrease somewhat as previously disturbed lands returned to equilibrium.

Because the acreage treated under the proposed action is a fairly small percentage of the acreage of the JKSYUs, peak flows and total water yield of the major watersheds would not be significantly impacted.

Sediment yield from disturbed lands would increase 15,650 tons under the proposed action. This increase is about 1.5 percent of the present sediment yield of the JKSYUs. While impacts to overall water quality would not be significant, localized areas could be significantly affected, particularly after the first major storms of the season. Should these areas feed recreational water bodies, impacts to water quality for recreation may occur (Section 3.7.1).

Harvesting by both clearcutting and shelterwood methods, and slash burning, would cause nutrient enrichment (nitrogen and other nutrients) of streams. Impacts would be localized immediately downstream of activities and may result in algal blooms or changes in the aquatic habitat. Use of herbicides and fertilizers in the JKSYUs would not significantly impact water quality.

A summary of the effects of the proposed action on water quality of the JKSYUs is found in Table 3-7. This is a summary only, and does not replace the information contained in the text.

3.5 IMPACTS ON VEGETATION

3.5.1 Terrestrial Vegetation

3.5.1.1 Cutting Practices

The removal of trees creates openings in the forest canopy, which allows more light to penetrate to lower forest strata. Timber harvesting initiates secondary plant succession similar to that caused by natural disturbances. Different cutting practices open the forest canopy to different degrees, thereby influencing the plant composition and duration of the plant communities differently.

Table 3-7

Effects of Proposed Action on Water Quality

Management Treatment	Total Nitrogen	Other Chemicals	Sediment Yield	Temperature	Comment
SILVICULTURAL PRACTICES					
Two-Stage Shelterwood (60,100 ac.)	9,015 lb increase over 5 years	slight increase	slight increase	slight increase	Effects of removing trees independent of any soil disturbance
Clearcut (4,000 ac.)	1,920 lb increase over 5 years	slight increase	slight increase	slight increase	
Single Tree Selective Cut (900 ac.)	slight increase	slight increase	slight increase	slight increase	
Commercial Thinning (15,225 ac.)	slight increase	slight increase	slight increase	slight increase	
TRANSPORTATION SYSTEM:					
375 Miles Permanent Road Constructed	increase amount unknown	slight increase	increase 2,900 tons over 5 years	slight increase	Impacts due to road construction would be long term, permanent
100 Miles Road Reconstruction	slight increase	slight increase	increase 825 tons over 5 years	slight increase	
50 Miles Road Surfaced	slight increase	slight increase	decrease 310 tons over 5 years	slight increase	
YARDING AND LOADING PRACTICES:					
Tractor and Cable (75,225 ac.)	increase amount unknown	increase amount unknown	increase 8,925 tons over 5 years	site specific	Compaction & surface disturbance initiate impacts to runoff water

Table 3-7 (Continued)

Management Treatment	Total Nitrogen	Other Chemicals	Sediment Yield	Temperature	Comment
DEVELOPMENT PRACTICES:					
Slash Disposal (56,700 ac.)	11,400 lbs over 5 years from burning	slight increase	increase 1,115 tons over 5 years	significant increase	Slash disposal would occur after yarding and loading of the timber
Mechanical Scarification (22,300 ac.)	slight increase	slight increase	increase 1,575 tons over over 5 years	slight increase	
Chemical Vegetation Control (29,690 ac.)	increase amount unknown	slight increase	slight increase	slight increase	Some slight hazard of water contamination by herbicide drift or residue would exist
Planting (57,450 ac.)	slight decrease	slight decrease	slight decrease	slight decrease	
Precommercial Thinning (7,960 ac.)	unknown	unknown	unknown	unknown	
Fertilization (23,185 ac.)	site specific increase	decrease amount unknown	slight decrease	no change	
TOTAL	22,335 lb minimum increase over 5 years	proportional increase as for total nitrogen	15,650 tons from disturbed lands over 5 years	proportional increase as for total nitrogen	

NOTE: This table is for summary and comparison only; it is not intended to replace derivative narrative.

Clearcutting

Clearcutting completely removes the forest canopy, thereby allowing the establishment of a well developed grass/forb stage. Approximately 4,000 acres (400 acres per year) would be clearcut in the JKSYUs under the proposed action.

Shelterwood Cutting

Two-stage shelterwood cutting, by virtue of lessened canopy removal, does not allow as much grass/forb development and produces an initial community more similar to a transitional grass/forb-shrub/seedling community. Approximately 27,200 acres of commercial forest in the JKSYUs would be converted to this transitional stage.

Single Tree Selection

As the name implies, the single tree selection harvest system involves the removal of individual, mature trees scattered throughout the stand. In heavily stocked forests, openings created by the removal of single trees are so small that only those species tolerant of shade and representing late successional stages can be perpetuated. In low density stands this cutting system may favor species of a less tolerant nature. Approximately 900 acres would be subjected to this harvest method under the proposed action.

Commercial Thinning

Commercial thinning, proposed for application on 15,225 acres in the JKSYUs, also opens the forest canopy but to a lesser degree than clearcutting or shelterwood cutting. Although understory vegetative growth may be somewhat stimulated, canopy opening is not generally sufficient to allow development of early plant succession.

Commercial thinning promotes accelerated rates of wood production in uncut trees. Thus, commercial thinning may be viewed as accelerating natural succession. This impact is generally negligible, however, since all merchantable timber would eventually be harvested.

3.5.1.2 Yarding Systems

Yarding is the movement of felled timber to a control point from which the logs are loaded onto a truck. Based on past timber sale contracts within the planning area, it is estimated that approximately 65 percent of the proposed harvest would be yarded by cable methods and 35 percent by tractor.

Both cable and tractor yarding entail dragging logs across the forest floor. Logs are constantly in contact with the soil in tractor yarding, whereas with certain cable yarding methods the logs are suspended above the soil for most of the way to the landing. Tractor yarding, therefore, causes greater proportional mortality to forest floor vegetation than cable yarding.

According to studies reported by the Environmental Protection Agency (U.S. EPA 1973), tractor yarding following clearcutting in western Washington resulted in baring 26.1 percent of the site to mineral soil. If this relationship is applicable to the JKSYUs, approximately 365 acres can be expected to be completely denuded of ground vegetation by the proposed action. U.S. EPA (1973) also reports that high lead cable yarding in conjunction with clearcutting bared 12.1 percent of the site to mineral soil. Application of this data to the JKSYUs indicates that approximately 315 acres would be made bare of ground vegetation by clearcutting followed by cable yarding.

By assuming that the regeneration cut of a shelterwood system (which removes up to 60 percent of the forest canopy) results in only 60 percent of the soil surface impacts of a clearcut, it is estimated that regeneration cutting followed by tractor yarding would bare approximately 1,490 acres. It is further estimated that regeneration cutting followed by cable yarding would bare approximately 1,280 acres.

The shelterwood final harvest cut (which removes the remainder of the canopy) in conjunction with tractor yarding is estimated to remove all the ground vegetation on approximately 1,200 acres. Shelterwood removal in conjunction with cable yarding is expected to bare the soil on approximately 1,030 acres.

In total, both yarding systems are expected to contribute to the total removal of approximately 5,000 acres of surface vegetation due to shelterwood harvest in the JKSYUs over the 10-year life of the proposed action. Depending on the severity of subsequent erosion, the majority of the denuded areas can be expected to naturally revegetate within 1 or 2 years.

Both yarding methods may injure standing trees, exposing them to insect or fungus infestation which may eventually result in death. Tractors, or the logs being dragged by them, may collide with trees, bruising or slashing them. Logs suspended from cables may slip or swing into standing trees causing upper stem or crown injuries. The extent of mortality or injury to trees is impossible to estimate but is expected to be minor.

Alteration of plant habitat is a function of soil disturbance and the destruction of vegetation which previously grew on the disturbed site. Skid trails and vehicle tracks, in addition to destroying vegetation, compact the soil, reducing its suitability for certain species of plants and favoring the invasion of species tolerant of compaction.

Yarding activities, especially tractor yarding, disturb forest litter and expose bare mineral soil, creating a better seed bed for many species (including Douglas-fir and most other conifers). Conifer reproduction, therefore, is enhanced by yarding activity, especially if associated soil compaction is not too great.

Skid trails often serve as channels for overland runoff and may reduce moisture infiltration on slopes. Therefore, less moisture is available for plants near the upper ends of these trails, whereas plants at the lower

ends of the trails may receive a disproportionate share. Depending upon topography, overland flow may impound at the lower ends of skid trails, creating temporary pools, or it may flow unimpeded into streams. In the former situation some vegetation (especially herbs) may be lost because of inundation while water-loving ephemerals may become established in the temporary pools. In the latter situation moisture stress may develop in the upper drainages, and gullies created by overland flow may cut to bedrock and remain unvegetated.

3.5.1.3 Road Construction and Maintenance

Construction of new roads is expected to add approximately 375 miles of road to the current network in JKSYUs. This construction would amount to approximately 1,770 acres. Many discrete impacting operations are associated with road construction and renovation. They include operation of tracked and wheeled vehicles, blasting, excavating, deposition of overburden and water application. All of the impacts are long term and are expected to persist until roads are abandoned and rehabilitated.

Most of the roads to be constructed within the JKSYUs would be permanent with all-weather surfacing. This type of road requires construction techniques which completely eliminate vegetation from the roadway and shoulder. Subsequent maintenance activities prevent natural succession. Therefore, initial construction eliminates the existing vegetation while traffic and regular maintenance prepetuate the impacts of construction. The ultimate impact of road construction and maintenance would be complete elimination of biological productivity (including timber production) on the entire 1,770 acres devoted to new road construction in the JKSYUs and prepetuation of this impact for the time that these roads remain under maintenance.

In addition to elimination of roadway vegetation, construction and maintenance may injure or kill adjacent vegetation. This effect could occur from bruises due to machine operation or from herbicide overspray along road shoulders.

Road construction severely alters plant habitat both on-site and off-site. Soil compaction within the roadway is usually so great that many years would be required for plants to recolonize, even if there were no traffic or maintenance.

Road surfaces are pitched to allow drainage. As water drains from the roadway and off the shoulders it creates moist soil conditions and provides habitat for plant species tolerant of disturbed soil and periodic excesses of water. Removal of vegetation from the roadway provides increased sunlight for roadside plants, which generally accelerates their growth in response. These factors (increased moisture, soil disturbance and increased sunlight) are often responsible for the rank growth of roadside "invader species" which are periodically removed by herbicide treatment or other maintenance.

Blasting and excavation for roadways often generates spoil materials which are unsuitable for construction use or are in excess of needs. These materials are often deposited in areas away from the site. This practice creates a potential adverse impact to off-site vegetation which may be injured or completely covered by the deposition of overburden.

3.5.1.4 Development Practices

Development practices are carried out to reestablish trees on forest land following harvest or natural catastrophes and ensure satisfactory or optimum growth. Individual practices are not necessarily used simultaneously, neither are they usually all applied to a single area. Many of the practices provide alternative methods, the choice of which is dependent upon the conditions of the area.

Gross Yarding

Gross yarding is an intensification of a conventional yarding method. As such, the effects of the vegetation and resulting impacts on the forest environment would be an extension of those analyzed under Section 3.5.1.2 Yarding Systems. Approximately 33,000 acres of logged sites would undergo slash removal by gross yarding if the proposed timber management plan is implemented. Assuming that gross yarding would bare about 15 percent of the treated acreage, it can be speculated that approximately 4,950 acres would be bared by gross yarding.

Slash Burning

Slash disposal by burning would be practiced on about 23,700 acres. The effects of burning would be short term and limited to small areas. While the chance of wildfire would be present, State and BLM safety measures would reduce the hazard.

Conifer and other plant seed could be destroyed or made sterile by the heat from the burning. Some plants, such as most grasses, have growing points that are close to or below the ground surface and can survive all but the hottest fire. Many shrubs have the ability to resprout from surviving stumps and roots and are stimulated by fire. So, while the immediate impact of burning would be bare, black ground, secondary succession (accelerated by the crown canopy removal) would produce a more vigorous vegetative cover than existed before the area was burned.

The burning and deposition of ash and the resultant changes in soil moisture relationships, nutrient availability and soil temperatures would alter the structure of the original understory plant community. Scheduled replanting of coniferous seedlings in the area would contribute to the alteration as a fire-induced plant community became established. Threatened or endangered species could be lost to the community.

Scarification

Scarification completely removes woody shrubs and removes or injures many plants in the herbaceous layer. Impacts resulting from scarification are expected to be short term. Threatened or endangered species could be killed or damaged. Soil moisture relationships would be affected by the break-up of the soil surface and the intermingled surface organic matter.

The disturbance of the soil would affect the availability of nutrients to the detriment of some species and the favor of others, due both to the physical mixing and to the changes in soil moisture relationships. Removal of vegetative material, which through a death and decay process ultimately would have become recycled nutrients for new plant growth, would result in a loss of nutrients.

Sudden removal of the lower canopy and shrub canopy would allow more light to reach the herbaceous layer, releasing those species to achieve their full photosynthetic growth potential. Increased exposure to sunlight would also affect soil temperature, which in turn affects soil moisture relationships and a large range of biochemical reactions. Soil temperature increase would generally favor increased soil microbial activity and increased plant growth up to a point, beyond which any temperature increase would severely limit plant growth, especially by newly germinated plants or planted seedlings.

The primary impact of scarification upon forest vegetation would be a change in the structure of the pre-existing community. This change could mean total loss or reduction in quality of habitat on the site for affected species, including any threatened or endangered species present. Under the proposed timber management plan, approximately 22,300 acres would be mechanically scarified before replanting.

Chemical Vegetation Control (Herbicides)

Herbicides are used to manipulate the species composition, size, density, vigor and presence of vegetation. In forestry applications, the desired effect is acceleration of plant succession from early successional stages to later stages dominated by conifers. This acceleration occurs by selective limitation of competition from plants characteristic of early stages in favor of rapid Douglas-fir establishment and growth.

Herbicides would be used in the JKSYUs both for site preparation (on 17,540 acres) and conifer release (12,150 acres). Both applications are targeted at the removal of nonconiferous species to provide a competitive advantage for conifers. Different herbicides work best for different target species and herbicides are often used in combination.

The direct vegetational impacts of silvicultural herbicide treatments are short term. Grass may be controlled for only 1 to 3 years with atrazine and dalapon while conifer seedlings become established. Grass may then partially reoccupy the site until Douglas-fir crown closure shades it out.

Similarly, many species of shrubs will resprout after treatment. Brush may resume dominance after site preparation spraying. However, it will generally not resume dominance after stand release spraying.

Therefore, the net short-term impacts of successful site preparation spraying in the JKSYUs would be a temporary reduction (of unquantifiable magnitude) of the natural productivity of grasses on approximately 3,600 acres proposed for stand release treatments with atrazine and/or dalapon. In addition, natural production of forbs and shrubs would be reduced on approximately 8,300 acres to be treated for stand release.

A temporary reduction in the natural productivity of grasses, shrubs, and herbaceous species would be expected on approximately 8,300 acres proposed for site preparation spraying with dalapon and atrazine. Temporary productivity reductions for herbs and shrubs would be anticipated for all 16,560 acres proposed for site preparation treatments with 2,4-D, Roundup and Krenite. These losses in herbaceous and shrubby vegetation production would be offset by increased production of coniferous species. Gratkowski and Lauterbach (1974) reported that aerial spraying effectively released Douglas-fir from dense overstories of varnishleaf ceanothus. Growth of released trees was 1.7 to 2.5 times that of comparable trees under unsprayed ceanothus. Basal spraying of ceanothus on small plots resulted in a similar growth response.

Non-target vegetation such as agricultural crops immediately adjacent to spray units may be affected by the movement of herbicides through the air. Such movements are limited but not eliminated entirely, by buffer strips and by application techniques (Gratkowski 1974). Relatively broad spectrum herbicide combinations, such as a tank mix of atrazine, dalpon and 2,4-D have the greatest chance of damaging non-target plants on the spray site.

Poorly timed herbicide application may result in damage to conifer stands. Minor burning of needles by oil carriers occurs. The possibility of vegetation impacts from accidental spills always exists.

Although the direct vegetational impacts of herbicide application are short term, the effects of accelerating the establishment of conifer stands are long term. Once the coniferous stands become dominant they will persist until the trees are harvested or until insects, disease or natural disasters remove them. Under fully managed conditions, the maximum amount of time the conifers can be expected to remain until logging is 80 years.

Planting

Under the proposed timber management plan, coniferous seedlings raised in nurseries would be planted on 44,050 acres. Approximately 32,850 acres of this would be on clearcut tracts or tracts subjected to first-stage (regeneration) cut under a two-stage shelterwood harvest system. The remainder would involve replanting or interplanting previously clearcut sites that are presently either not stocked or understocked. An aggregate of 13,400 acres would be programmed for possible replanting and interplanting on sites where the initial treatment failed to accomplish adequate stocking levels.

Planting practices are designed to shorten the time commercial conifer species otherwise need to become reestablished after logging. Planting greatly increases the competitive advantage of the conifer seedlings over the vigorous released growth of the plant communities present on a logged area. Under the best possible site conditions, natural regeneration could occur in 1 year. Under artificial regeneration, seedlings are generally planted the first year following harvest. Because the planting stock is generally already about 2 years old, it has at least a 1-year competitive advantage on good sites and an even greater advantage on poorer sites. Therefore, planting shortens the amount of time required for natural succession to progress beyond the grass/forb and shrub/seeding stages. The major long-term impact associated with planting is that, by increasing the competitive advantage of Douglas-fir, early successional stages are more quickly passed through and Douglas-fir attains quicker site dominance. This acceleration not only reduces the residence time of early successional stages but also precludes the development of maximum plant diversity.

Precommercial Thinning

Precommercial thinning of some 7,960 acres would take place in the next decade under the proposed action. Removal of selected trees from the general level of the stand canopy would release the remaining trees from competition for light, moisture and nutrients, and thereby allow them a more optimum growth rate. Understory plants could be damaged during the thinning operation, including any threatened or endangered species present.

The stands treated could be so dense that most of the cut trees would remain in place, supported by living trees. Therefore, the resulting impacts to the understory vegetation would be gradual, as the dead trees fell and decayed with the passage of time and growth of the remaining stand. However gradual, the change in available light, soil moisture relationships, and nutrient availability could change the structure of the original understory community.

Fertilization

Approximately 23,185 acres of timber stands would be fertilized after proposed precommercial and commercial thinning operations. The impacts associated with fertilization would be short term. This practice would result in an immediate increase in nutrient availability that could favor the establishment of new species while decreasing the vigor of, or eliminating, existing species. The physiology of threatened or endangered species and/or their competitive status in the community could be negatively impacted.

3.5.2 Aquatic Vegetation

Most potential adverse impacts to aquatic vegetation in the JKSYUs have been effectively mitigated in the proposed timber management plan.

Loss of a small amount of aquatic habitat would occur as a result of newly constructed roads crossing streams. It is estimated that one perennial stream (less than 5 cubic feet per second discharge) and four intermittent streams, on the average, must be crossed for each mile of new road construction. This means that 375 perennial stream crossings and 1,125 intermittent stream crossings could be expected with the proposed construction of 375 miles of new roads. Assuming that 90 percent of all proposed stream crossings would be by culverts and further assuming that the average culvert length is 40 feet for perennial streams and 30 feet for intermittent streams, approximately 2.6 miles of perennial and 5.8 miles of intermittent stream and riparian vegetation would be eliminated over the 10-year life of the proposed action.

Bridge crossings do not replace stream beds as do culverts. However, due to the constant dense shade under bridges, they may alter the natural vegetative production in streams. Assuming that the average bridge is 18 feet wide, perennial stream productivity may be altered in approximately 675 feet of stream length.

Aquatic vegetation also occurs in seeps and springs which are widespread and varied in size and flow rates. An unknown amount of chemical or sediment pollution could occur due to timber management practices. Plant species present could be damaged or killed. Even slight modification would cause a change in species composition, i.e., relative numbers of each species in the community.

Timber management practices could severely affect these relatively small ecosystems, to the point of complete elimination of the spring or seep area, by drying up the water source.

Fertilization of timber stands and herbicide applications are not expected to significantly impact aquatic vegetation because of the no fertilization-no spray buffers along perennial streams. Fertilization necessary to revegetate roadsides could, through drainage and leaching, contaminate waters and thereby affect aquatic vegetation. Impacts would materialize as changes in both structure and composition of these plant communities. In the case of fertilizer pollution, increased nutrient levels in the water would favor an increase in algae and shade tolerant plants. This could increase stream turbidity and reduce water temperatures.

All impacts to aquatic and riparian vegetation are expected to be insignificant.

3.5.3 Threatened or Endangered Vegetation

Plant species listed in Tables 2-4 and 2-5 could be susceptible to any of the impacts described under terrestrial vegetation or aquatic vegetation. Under worst case conditions, the direct effects of injury or death to the plants could cause the immediate extinction of a species in all or a significant portion of its range. The more subtle effects of vegetative community changes could cause the eventual extinction of a species through loss of competitive ability relative to other vegetation on the site.

If any species of vascular plant is determined to be threatened or endangered by the finalized listing (to be published by the U.S. Fish and Wildlife Service), any action that contributes to its extinction or to its threatened or endangered status would be in violation of the Endangered Species Act of 1973. Therefore, the Environmental Assessment (EA), which would be prepared prior to any site specific action, would identify any threatened or endangered plant species known to be present on the site.

3.5.4 Conclusions

Alterations to community structure and community longevity would be the most significant impacts to terrestrial vegetation. These impacts are significant because they represent the long-term elimination of the majority of old-growth communities from high intensity lands in the JKSYUs. Continued forest management would not allow natural succession to replace these communities with the passage of time because future forests would be harvested before they reached the 80-year age class.

Other impacts to terrestrial vegetation are less significant because vegetation which is disturbed or destroyed by timber management would eventually be replaced by other plants of the same species and natural succession would be given time to restore community structure.

3.6 IMPACTS ON ANIMALS

3.6.1 Introduction

The impacts of the proposed action on the animal resource are the result of the particular operation or combination of operations to which the resource is subjected. Different components of the animal community may be affected differently by each individual action. The following discusses the effects the proposed action would have on terrestrial vertebrates, fish, and threatened and endangered species.

In most cases the effects on animal habitat will be discussed since this is where the greatest and longest-term impacts would be. Examples are used for explanatory purposes while the anticipated impacts on selected species are shown in Table 3-8, located at the end of this section.

3.6.2 Terrestrial Vertebrates

3.6.2.1 Cutting Practices

The greatest effect the proposed timber cutting would have on the terrestrial vertebrates would be the elimination or modification of about 79,000 acres of existing habitat. Different cutting schemes would affect these acres in different ways. The removal of mature and old-growth forests, or parts thereof, removes the habitat of those species of animals adapted to exist in that plant association. If similar unoccupied habitat exists nearby then

those displaced individuals could occupy them. However, it is unlikely that such a situation exists as it is assumed that habitats are currently at carrying capacity. Therefore, unless those displaced individuals can adapt to the new conditions they would probably perish.

There are some 94,500 acres (Table 1-8) of lands that have been withdrawn from harvest that contain some old growth. The majority of these lands are in either low intensity or limited forest management status and have not been inventoried in place. In general, while these lands do contain some old growth, the quality of the habitat is not equal to the old-growth habitat found on the high intensity lands. However, if it is distributed across the SYUs, it should provide some habitat for old-growth dependent species.

Snag-dependent wildlife would be adversely affected due to snag removal during harvest operations. A proposed management decision calls for snags and cull trees to be left on edges of clearcuts. Also at least one 24-inch snag (35 feet in height), one cull tree, and three dead trees either standing or down should be left on each 2 acres in shelterwood and single tree harvest areas.

The vegetative successional stages that follow would benefit species adapted to these conditions. In some cases a clear benefit/harm factor is not easily projected. For example, deer use thick timber for hiding and thermal cover. Food supply, however, is more abundant in clearcut areas where plant succession is in its early stages. A clearcut, then, may provide abundant food for several years and benefit deer, but if the harvested area provided the only cover, this increased food supply may not be utilized.

Single tree selection harvest will not be discussed as it was judged to have insignificant affects on terrestrial vertabrates.

Clearcutting is proposed for 1,150 acres during the initial 3 years and for a total of 4,000 acres during the decade.

For approximately the first 5 years following clearcutting, animal species that use successional stages other than grass/forb would not use these acres except perhaps for passage. Species that use old growth would be eliminated forever as harvest plans call for another cut of second growth at 60-80 years, thereby precluding the establishment of old growth (200+ years) on those acres.

Food supplies for grazers and browsers would increase in the early successional stages. Deer and elk use would increase and peak 6 to 8 years following clearcutting (Harper 1969 and Crouch 1974). Likewise increased populations of deer mice, Oregon voles and snowshoe hares would increase while Douglas squirrels, redback voles and northern flying squirrels would probably decrease (Gashwiler 1970). Raptors such as goshawks and great horned owls that nest in mature or old growth would have their nest sites protected as indicated in Table 1-6. While this action may safeguard known nests, it may remove the surrounding foraging areas of old-growth dependent species and have a significant impact on them.

During the first 3 years, 150 acres of crucial deer winter range (Sales 81-11, 81-22, 82-11 and 82-18) and 400 acres of elk winter range (Sales 80-3, 80-13, 80-15, 80-16, 81-14, 82-3, 82-11 and 82-12) would be clearcut. This would increase food supply and decrease thermal cover. This amount is not significant as there are an estimated 337,000 acres of crucial deer winter range in the JKSYUs. There are approximately 257,000 acres of elk winter range in the JKSYUs. None is considered crucial. It is unknown how many acres of winter range would be clearcut during the remainder of the decade.

Shelterwood harvest would be applied to approximately 11,700 acres in the planning area during the first 3 years and to about 49,500 during the first decade. Shelterwood cutting would eliminate mature and old-growth timber as surely as would clearcutting. It does, however, take a longer period of time, and allows conifer seedling establishment. By opening up the canopy during the first stage of cutting, some species of animals may be benefited by the limited amount of grasses, forbs and shrubs that would initially be present. After the final cut, the conifers that were established would probably outcompete the other vegetation and eliminate that habitat type.

The impacts of shelterwood harvest on most species of animals are not well known as most research seems to have been directed at clearcuts. However, Edgerton (1972) does point out that deer and elk use in areas that have had shelterwood harvest is lower than use in either clearcuts or unharvested areas. This is because they lose their cover requirements and fail to gain a greatly increased food supply.

Size is also a factor as large shelterwood cuts essentially become large clearcuts after final harvest. The increase in early successional stage vegetation, while not as abundant as in clearcuts, is beneficial to some species. For animals such as deer and elk, large shelterwood cuts are not usable except along the edges where escape cover is available.

Approximately 700 acres of crucial deer winter range are scheduled to receive shelterwood harvest during the first 3 years. This acreage is located in Sales 80-17, 81-11, 81-22, 82-11 and 82-18. Sales 80-1, 80-3, 80-14, 80-15, 80-16, 80-17, 81-2, 81-3, 81-14, 82-1, 82-3, 82-12 and 82-14 occur in elk winter range and approximately 5,000 acres would be subject to shelterwood harvest. While this type of harvest is detrimental to elk and deer habitat, it would not have a significant effect as it is scattered throughout the planning area and is in small tracts. It is not known how many acres of winter range would be shelterwood cut during the rest of the decade.

Overstory removal would occur on about 8,400 acres during the first 3 years and total about 10,500 acres during the decade. The removal of the overstory would leave fully-stocked stands of trees of various ages, the majority between 40-90 years. While old-growth dependent species would be adversely impacted, those species using the younger age forests would be benefitted.

During the first 3 years about 300 acres of crucial deer winter range (Sales 81-22 and 82-18) would receive overstory removal. This is considered to be insignificant.

Commercial thinning would advance succession by removing competition on approximately 15,000 acres. This would benefit those species associated with older forests. The impacts are not expected to be great since the forest would be in a young, second-growth stage. According to Meslow (1978) there are no species of birds that nest exclusively in this stage in the Douglas-fir community. Thomas et al. (1977) also indicate that this successional stage supports a low diversity of animal life.

Conclusion

The proposed action would alter habitat and animal species composition and numbers that use those habitats on approximately 79,000 acres over the 10-year length of the proposal. Clearcutting, shelterwood cutting and overstory removal would remove trees in the older age classes from approximately 21,000 acres during the first 3 years and 64,000 during the decade. Secondary succession would occur on those acres, providing different habitats than prevously existed.

The proposed action would have a significant negative impact on those animal species like the northern flying squirrel and Vaux's swift that are dependent on old growth. The impact would be both short term and long term since timber management practices would maintain younger stands of trees. The action would have significant positive impact on species utilizing early successional stages such as deer mice, elk and savannah sparrows. Based on the 3 year site specific information, the effects on elk winter range and crucial deer winter range would not be significant.

3.6.2.2 Yarding

The impacts of yarding operations on wildlife populations differ with the type of operation and the susceptibility of the animal. The main impact results from the skidding of logs, which destroys low vegetation, compacts the soil and alters drainage patterns. As discussed earlier, the intensity of these disturbances differs with the yarding system and the physical environment in which it is applied.

The complete, but temporary, destruction of 5,680 acres of surface vegetation (see Section 3.5.1.2) would reduce the amount of habitat for small rodents and insectivores. Shallow soil disturbances that do not remove excessive topsoil may benefit local wildlife populations such as elk, deer, seed eating birds, certain rodents, etc. that depend on early successional communities. Swanson (1970 Cited in Bunnell and Eastman 1976) reported significantly higher elk use on moderately or heavily disturbed sites than on lightly disturbed sites.

3.6.2.3 Road Construction and Maintenance

Road construction would eliminate vegetation from the surface of 375 miles of road planned in the proposal. This translates into approximately 1,770 acres of habitat that would be eliminated during the decade. In the first 3 years, 93 miles of road occupying 440 acres are planned.

The impacts of habitat elimination would be significant, adverse and perpetual since most road systems would be maintained indefinitely. The impacts may be partially mitigated by vegetation that usually becomes established along road shoulders. Increased mortality due to hunting and collisions with vehicles is unpredictable but probably insignificant.

Harassment of wildlife by vehicles undoubtedly would occur and during stress situations, such as times of temperature extremes, may have an adverse impact. It is not possible to quantify this. However, MFP recommendations are to close spur roads when problems such as wildlife harassment occur. Experience has shown that many gates are destroyed and road closures are almost impossible to effectively enforce.

3.6.2.4 Development and Protection Practices

Development and protection practices are undertaken to enhance timber production and to protect standing timber from destruction by various agents. The practices are varied and numerous but their major impacts all involve the alteration of animal habitat through vegetative manipulation.

Scarification, planting, and fertilization were judged to have no significant impacts on terrestrial wildlife and are not discussed.

The removal of logging residue during gross yarding would remove existing and potential snags and forage logs from the area so treated. It would, however, make access through the area easier for large mammals by removing accumulated debris. Gross yarding would also remove shade, allowing certain plants to be established earlier, which would benefit herbivores.

Slash burning would eliminate all live vegetation and combustible material from the treated areas for a limited period of time. This would be followed by a vigorous growth of grass, forbs and shrubs.

Immediate impacts would be removal of vegetation and associated animal populations from some 6,000 acres during the first 3 years and 23,700 acres during the decade. This would last less than one growing season, after which vegetation and animal populations would become reestablished.

Harper (1969) reported higher Roosevelt elk use on logging sites that had been burned than on those that had not been burned, and explains that on burned sites grasses were more than three times as abundant. Grasses are a preferred food item of elk. He warned, however, that slash burning would not necessarily increase forage and subsequent elk use on all sites as physical characteristics make each site different in its response to burning.

Crouch (1974) indicated that slash burning increased the food supply for black-tailed deer and also removed obstacles to deer movement.

Burning retards succession and makes the early stage vegetation available longer, favoring animals adapted to early stages. However, burning also

removes forage logs and potential forage logs to the detriment of insect-eating species.

The proposed action calls for herbicide use in site preparation on 17,540 acres and an additional treatment on 12,150 acres for conifer release.

There are four major types of impacts to animals associated with the proposed silvicultural herbicide application: exposure to toxic chemical levels, exposure to chronic levels, habitat modification and carrier impacts. The following is a brief description of these four impacts. For much greater detail, refer to BLM′s Herbicide Environmental Statement (USDI, BLM 1978d).

Exposure to acute toxicity levels of herbicides is not anticipated as none of those proposed for use have been reported to be highly toxic to wildlife, when used as manufacturer′s label prescribes.

Chronic (long-term) effects of herbicides on animals are generally low for those herbicides proposed for use. In some laboratory tests however, rats fed with high doses of 2,4-D mixed in their food showed a statistical tendency toward tumors, but the researchers did not conclude that 2,4-D was carcinogenic (Hansen et al. 1971). In another part of the same study, dealing with reproduction in rats, the authors state "While a level of dietary 2,4-D as high as 1,500 ppm appears to have had no deleterious effects on fertility of the male or female rats or on average litter size, it did sharply reduce the percent of pups born that survived to 21 days of age and depresed the weights of these weanlings."

Gyrd-Hansen and Dalgaard - Mikkelsen (1974), Somers et al. (1974a) and Somers et al. (1974b) report that Lutz-Ostertag and Lutz (1970) found that pheasant and partridge eggs sprayed with 2,4-D had high mortality and large numer of malformations among the embryos. However, these same authors were unable to duplicate these results. Gyrd-Hansen and Dalgaard (1974) did report embryotoxic and teratogenic properties after high levels of 2,4-D had been injected directly into the yokes of hens eggs. Also, Dost (1978), in reviewing the literature, reported the fetotoxic and teratogenic effects of 2,4-D in the laboratory. None of these results have been substantiated in the field.

Herbicides have pronounced impacts on wildlife habitat. These impacts are brought about by losses of habitat diversity and stratification resulting from the temporary elimination of certain plants that are in competition with the desired coniferous species. This would adversely impact those animals that utilize the grass/forb and shrub/seedling successional stages.

Diesel oil is often used as a carrier for forest herbicides. Data on the toxicity of diesel oil on wildlife are limited; however, some work has been done on the adverse effects on adult ducks (Tucker and Crabtree 1970; Hartung 1966; Hartung 1965). It is unlikely that wild animals would consume lethal amounts of the carrier because of the dilution factors involved.

Other potential impacts include the coating of eggs, thereby affecting their hatchability; and the soaking of individuals, making them more susceptible to other environmental stresses. However, data are insufficient to

accurately predict the impacts of diesel oil carrier on animals in the planning area.

Underground baiting with strychnine-treated oats to control pocket gopher activities is planned for 9,000 acres within the planning area.

Main impacts from the proposed action would be the reduction in numbers of pocket gophers over those acres. Other small mammals using gopher burrows could eat the bait and be killed. The extent of this is unknown but Hegdal and Gatz (1977b) did report decline of other small rodents on their study areas. The oats could remain toxic for 30-90 days, depending on soil conditions (Personal communication, Tietjen 1979).

The secondary poisoning of raptors does not seem likely as most gophers die underground. In addition, Garlough and Ward (1932 Cited by Rudd and Genelly 1956), reported that one hawk (species unknown) survived 368 milligram per kilogram (mg/kg) of strychnine obtained from poisoned rats. They estimated that 50 squirrels killed with strychnine would have to be eaten for a fatal dose. Hegdal and Gatz (1977b) also reported no secondary effects on raptors or mammalian predators. They did, however, report the loss of one mourning dove.

It is known that pocket gophers damage conifer seedlings. However, Maser et al. (1978) have speculated that small animals, including pocket gophers, may be beneficial in establishing coniferous forests by innoculating the ground with the spores of mycorrhiza-forming fungi. These fungi form a symbiotic relationship with the tree roots and are important in mineral transfer and disease prevention.

In conclusion, the impacts would be significant to the pocket gopher population on the treated areas. Lesser impacts may be anticipated to other small rodents using gopher burrows. No impact is expected to other mammals or raptors. If careful handling of the bait is employed so that none is spilled aboveground, impacts to other species would be insignificant. Howver, if bait is inadvertently left on the ground surface, the impacts to granivorous (seed or grain-eating) species could be locally significant (Hegdal and Gatz 1977a).

Precommercial thinning, although it may open a young forest canopy, generally does not beneficially impact deer and elk because the unremoved slashings impede movements. Therefore, the obstacle presented by slash accumulations prevents deer and elk from utilizing any forage increases which result from the thinnings. Cover use is also prevented by slash accumulations. Assuming that all the areas to be precommercially thinned would prevent deer and elk utilization, this practice would result in the removal of about 8,000 acres of potential deer and elk hiding cover. This condition could last as long as two decades before decomposition removed the obstacles.

Conversely, birds and small mammals may increase their use of an area following precommercial thinning. Slash accumulations provide cover for them and any increases in forage production can be utilized.

Conclusion

The impacts of development and protection practices would be only slightly significant compared to the cutting of the forest. Most of the development practices proposed would tend to advance succession. This would benefit coniferous forest dwellers such as western gray squirrels, red tree voles and martens at the expense of grass and brush utilizing species such as mountain quail, least chipmunks and deer.

The use of herbicides on 29,690 acres would simplify the vegetative structure and composition on those acres and would be detrimental to animal species that use early successional stage vegetation. The chronic effects of 2,4-D on bird life is a possibility. If the effects are substantiated under field conditions, then the effects could be adverse and significant.

Baiting would have a significant adverse impact on pocket gophers inhabiting the 9,000 acres proposed for treatment with poison bait, since baiting is estimated to reduce the population by 90 percent.

3.6.3 Fish

The impacts of the proposed action on fish and their habitat fall into the broad categories of increased accumulation of bottom sediments, increased amounts of suspended sediments, altered amounts of stream flow, introduction of logging debris and change of water temperature.

There are approximately 765 miles of Class I streams in the JKSYUs. Analysis of the 3-year timber sales shows that approximately 16.5 miles of 20 different Class I streams pass through or are adjacent to cutting areas of 22 timber sales. Of these 16.5 miles, only about 2 miles are used by steelhead and coho salmon while the remainder probably support trout.

It is difficult to generalize about the impacts of the proposed action on fish, for as Moring and Lantz (1974) pointed out after a review of the literature, "Certain salmonids are more susceptible to environmental changes in streams." Coho salmon and Dolly Varden are more tolerant to changes in physical parameters while other species such as cutthroat trout are more susceptible. See Section 2.8.2 for species occurring in the JKSYUs.

It is even more difficult to quantify the effects of logging on fish for as Burns (1971) pointed out in his study of carrying capacity for juvenile salmonids in Northern California, "Even with 3 years of prelogging study, it would be difficult to attribute a change in carrying capacity under 50 percent to anything but natural variation."

The habitat of aquatic invertebrates, which are important both as food for fish and as indicators of stream quality, can also be modified or destroyed by

the same factors that affect fish habitat. It is assumed that impacts to most invertebrates would be similar to those experienced by fish in localized areas. It is not possible to quantify these impacts.

The maintenance of buffers as outlined in Table 1-6 should help minimize stream degradation. Research by Erman et al. (1977) revealed that when buffer strips of at least 30 meters width on each side were maintained, the macroinvertebrate populations were indistinguishable from those of unlogged streams.

Section 3.4 Impacts on Water Resources provides data on expected amounts of sediments and water that would reach the streams of the JKSYUs and compares them to existing amounts. Many of the analyses and conclusions appearing in this section are based on those data.

3.6.3.1 Cutting Practices

The cutting of a forest affects water yield regardless of the method used. Cutting may be responsible for debris entering a stream and can also influence water temperature if streamside vegetation is removed. Cutting does not, however, influence sediment yield (see Section 3.4.2 Water Quality); therefore cutting *per se* would have only a limited impact on the streams of the JKSYUs under the practices outlined in Section 3.4.2. Single tree selection is not discussed as it was judged to have no effect on fish.

Tree removal along stream courses has been shown to alter water temperature. Increased highs during warm months have been reported by Brown and Krygier (1967), Gray and Edington (1969) and others. Eschner and Larmoyeux (1963) reported that clearcutting resulted in significantly higher maximum stream temperatures in the growing season and lower minimum temperatures in the dormant season. Moderate cutting did not produce water quality changes that might be harmful to trout. Where some stream side vegetation is retained, no change in temperature was observed (Brown and Krygier 1970).

Clearcutting increases water yield, which could have a scouring effect on stream bottoms. Because of the limited acreage proposed for clearcutting, water yield increases could have a local minor adverse impact but a negligible one to the JKSYUs as a whole. Where buffer strips are maintained it is unlikely that significant amounts of debris would enter the rivers.

The impacts from shelterwood harvest are the same as from clearcutting, but on a reduced basis for a similar size acreage. However, shelterwood harvest is planned for application on a much greater area and overall water yield is expected to increase more than eight times over that of clearcutting. This could have significant local impacts but minor impacts for the SYUs as a whole.

Commercial thinning and overstory removal would each increase water yield over the JKSYUs to a level between that of clearcutting and shelterwood harvest. The impacts could be locally significant but are unpredictable because of non-site specific information.

3.6.3.2 Yarding

Yarding methods proposed for the JKSYUs could slightly increase water yield but could contribute considerable sediment to local streams. Increases in bottom sediment, according to Gibbons and Salo (1973), cause the most damage of all factors affecting aquatic life. A potential for increase in sediment yield during the first 3 years occurs on the West Fork of Evans Creek (Sale 81-17 and 81-19). Should project design features fail, this steelhead and coho stream could be impacted.

The impacts caused from additional sales in the remaining 7 years could be locally significant and adverse but of minor significance to the JKSYUs as a whole.

3.6.3.3 Road Construction and Maintenance

The construction of roads would add greatly to the sediment load of river systems. Poor maintenance of existing roads would continue to contribute to this problem. Road construction times and methods are designed to keep sedimentation to a minimum (see Section 1.3.1.2 Project Design Features).

The proposed action would greatly reduce the amounts of sediment produced from previous highs (see Table 8-4). However, these actions would still degrade water quality and have an adverse impact on fishery values in the JKSYUs.

The transportation system would require the installation of culverts. The predicted frequency of stream crossing shown in Section 1.3.1.1 indicates one perennial stream crossed per mile of road. Stream crossings for the 3-year plan are far below the predicted number. Analysis of that plan reveals only 19 crossings of perennial streams are planned for the 93 miles of new road to be constructed.

Assuming culverts averaged 40 feet in length, then approximately 760 feet of stream habitat would be eliminated. Only five of these crossings are in streams of known fishery values. This is not significant. However, Sales 80-12, 81-3 and 82-20 have proposed crossings in areas where soils are such that sedimentation may be a problem to streams (Evans Creek, Lost Creek and Star Gulch) that have fishery values. Experience in the JKSYUs has indicated that construction of stream crossings causes considerable and dramatic effects for a short period in the immediate vicinity (100 feet). However, timing is such that spawning fish are not impacted. Prior consultation with the District fisheries biologist usually results in avoidance of important areas.

In discussing impacts to the aquatic invertebrates, Erman et al. (1977), suggest that repeated failure of road crossings was the cause of disruption of the stream biota, not the construction of road crossings. Investigations in the vicinity of newly installed culverts showed only a slight impact.

The number one contributor of sediment associated with road building is mass movement such as land slides. During the planning phase, potential problem sites are located and avoided. However, mass movement still occurs since not all sites can be identified accurately. Accordingly, site specific predictions of failure are not possible for the proposed action.

3.6.3.4 Developmental Practices

Burning, gross yarding, baiting, precommercial thinning and fertilization are not expected to have a significant impact on fish.

Scarification would cause a slight decrease in water yield and a slight increase in sedimentation. While the increase could be locally significant, it would not be significant to the entire watershed of the JKSYUs.

The chemicals proposed for use for vegetation control and the levels of their application are not expected to measurably affect aquatic vegetation. Streamside vegetation that provides shade could be altered in a worst case circumstance. Buffer strips along streams should prevent this from occurring. However, due to pilot error, some parts of these buffer strips may receive application.

Toxic effects of herbicides on fish have been documented in the laboratory and reviewed by U.S. EPA (1977). Proposed field application rates would be considerably less than the minimum lethal dose for those species tested (see BLM final ES on herbicides, 1978, for more detailed information).

Planting would accelerate succession and, therefore, retard runoff and provide shade more quickly than natural succession. This process may benefit fish; however, it is not possible to quantify this benefit.

Conclusion:

In all but worst case situations, the impacts of the proposal would be minimized by design features such as buffer strips, methods and timing of road construction, and logging methods.

Water temperatures are not expected to change, but water yield may have a small local impact.

Sedimentation is expected to have an adverse impact, particularly in small streams. Most of the sediment would come from yarding practices. Road building is expected to contribute less than 1 percent of the total sediment yield of the JKSYUs to the Rogue River.

Stream crossings could eliminate 15,000 feet of habitat if the predicted number of 375 culverts were installed during the 10-year proposal. While this would probably result in lower production, it would not be significant to the JKSYUs.

Impacts to fish and fish habitat would occur and be adverse as the result of the proposal. These impacts, which would be caused by increased sedimentation, cannot be quantified but are likely to be adversely significant on small individual streams. The impacts to the larger systems would be adverse, but minor.

3.6.4 Threatened and Endangered Species

Threatened and endangered species receive special attention under the terms of the Endangered Species Act of 1973 and BLM policies and guidelines. Known locations of these species are avoided and special precautions taken to assure their well being. (Section 1.3 Design Features).

The expected impacts to those species recognized by Federal or State lists as threatened, endangered or undergoing status review are discussed in this section.

3.6.4.1 Cutting Practices

Habitat modifications caused by cutting practices would have the same types of impacts on threatened and endangered species as they would on other wildlife. Some species may be adversely affected; others may not.

Little is known about the effects of clearcutting on the Siskiyou Mountain salamander. Nussbaum (1974) urged caution when clearcutting in areas of salamander habitat, but also made population estimates in excess of 3 million individuals and established that their range was larger than previously thought. Of the eight known locations where these salamanders occur in the planning area, six are located on lands classified as high intensity commercial forest lands administered by BLM and therefore could be scheduled for harvest during the first decade. None, however, are scheduled for harvest during the first 3 years. Regardless, it is probable that clearcutting would have an adverse impact on the species in localized areas.

The peregrine falcon would probably be unaffected by timber harvest. This species, which is not a forest dweller, forages in open spaces and nests in rocky outcrops. Most suitable habitat is confined to the Klamath River Canyon.

Bald eagles are not expected to be adversely impacted by the proposed action. The one known nest is not on land administered by BLM and the large communal roost site is now protected by Federal refuge designation. The foraging area for the large roost is in the Klamath Lake area well to the east of the SYUs.

Foraging areas for the birds occupying the known nest site are unknown and a conflict could arise.

The northern spotted owl is dependent on old-growth, closed canopy forests. Pursuant to the Oregon Endangered Species Task Force recommendations, a joint agreement with the State of Oregon, U.S. Forest Service and the U.S. Fish and Wildlife Service was signed, and BLM has agreed to protect 14 pairs of owls in the Medford District. Eight of these have been assigned to the JKSYUs. The management plan calls for total protection of 300 acres of old-growth core area (if available) and an additional 900 acres to be managed to provide at least 50 percent of the acreage in stands of 30+ year-old forests. The eight pairs receiving protection may change occasionally as new pairs are located or new timber replacement stands become available.

Additional northern spotted owls in excess of the eight pairs may have their habitat reduced or eliminated if it is in a sale area. The results of this action are unknown. However, if it is assumed that all lands are at carrying capacity, then it is likely these owls would be eliminated. Two nest trees are within the boundaries of Sales 81-21 and 82-18. Five nest trees in Sales 80-22, 80-23, 81-4 and 82-20 are within one-third mile of areas scheduled for shelterwood harvest in the first 3 years. It is possible that the owls occupying these nest trees would be eliminated due to removal of their habitat.

The bobcat is a creature of wide habitat range and it can adapt to many situations. While those individuals located in a cutting area would be displaced within 3-4 years, clearcut areas would provide suitable habitat and probably be reoccupied. Clearcuts may be beneficial to surrounding populations as many of the species which make up the bobcat's food supply increase greatly after clearcutting.

River otters need clean water and an aquatic-oriented food supply although they occasionally do eat other things such as bird eggs (Ingles 1965). Clearcutting alone does not influence water quality, therefore little impact is expected.

Conclusion

Clearcutting may have a severe adverse impact on those populations of Siskiyou Mountain salamanders dwelling inside areas that would be harvested. No known locations of salamanders are scheduled to be harvested during the first 3 years. The impact to the species as a whole for the remainder of the decade is impossible to predict without site specific information.

Seven known nest trees are within one-third mile of proposed sale areas and individual spotted owls may be adversely impacted by clearcutting, shelter-wood harvest and overstory removal. By following recommendations of the interagency management committee, the species as a whole would be only moderately affected.

Bobcats may benefit by clearcutting as their prey would probably increase. Although individual animals may be displaced by clearcutting, the overall effects are expected to be slight.

River otter would not be adversely impacted by harvesting.

Bald eagles and peregrine falcons are not expected to be adversely impacted by the proposed action.

3.6.4.2 Yarding

This practice may prove to be detrimental to Siskiyou Mountain salamanders living in the area so treated. It probably would not be greatly accumulative on top of harvest practices as the shade removal from harvest would likely produce the primary adverse impact.

Yarding does increase soil disturbance; therefore, water quality could be affected. River otters may be locally impacted, but impacts would be of low significance to the species as a whole within the SYUs.

Yarding practices would have negligible affects on spotted owls, bald eagle, peregrine falcons and bobcats.

3.6.4.3 Road Construction and Maintenance

Road systems are not expected to affect threatened and endangered species to any degree that is quantifiable. The roads themselves may destroy habitat but may provide new habitat for Siskiyou Mountain salamanders. Nussbaum (1974) points out that many times road cuts provide good habitat into which surrounding populations can expand.

Logging roads are the greatest source of human-caused inorganic stream sediments (Gibbons and Salo 1973). Therefore, the habitat of the river otter may be adversely affected.

The other species would probably be affected only to the extent that access by vehicle would be provided to previously unaccessible areas. This impact cannot be quantified or qualified.

3.6.4.4 Developmental Practices

The proposed development practices would not affect threatened and endangered species any differently than other species. When these practices are employed, the forest has been cut; therefore the major habitat modifications have already taken place.

The habitats of the river otter and Siskiyou Mountain salamander could be adversely impacted by gross yarding, accidental burning along streams and scarification.

It has been shown by Gashwiler (1970) that populations of some small mammal species do increase after burning. Some of these are prey species of bobcats and therefore could have a local positive benefit.

Other threatened and endangered species are not expected to be impacted.

Planting may benefit river otter by improving water quality. The impacts would be difficult to assess without site specific information. Planting also may restore shade needed to reestablish any Siskiyou Mountain salamander habitat that had been temporarily degraded by other practices.

Significant impacts to threatened or endangered species are not expected from other treatments.

Conclusion

Development practices would adversely impact water quality in localized areas and therefore may significantly affect river otter habitat. They may also cause increases in some of the bobcats' prey species and have positive effects on the bobcat. Neither impact is quantifiable or expected to be significant compared with the effects of timber harvest or road building.

Consultation

Officials of the U.S. Fish and Wildlife Service agreed, during informal consultation, that the proposed action would have no adverse effects on any species listed as threatened or endangered.

If the on-site surveys conducted prior to each individual sale uncover the presence of a threatened or endangered species, then the consultation process may be renewed.

3.6.5 Summary of Conclusions

The most significant impact to terrestrial wildlife would be the removal of old-growth timber and its replacement with early successional stage vegetation. Table 1-4 indicates that currently there are about 98,000 acres of trees that are 200 years old or older on high intensity lands. By the end of the first decade, this acreage would be reduced to about 68,000 acres, a 31 percent decrease. Additional old-growth habitat exists on lands withdrawn from harvest (Table 1-8). However, the amount, quality and distribution of this is unknown.

This 31 percent decrease in old-growth habitat would probably be accompanied by a 31 percent decrease in numbers of old-growth dependent species such as the northern spotted owl, Vaux's swift and northern flying squirrel. This reduction would be significant, adverse and permanent.

If the proposed level of harvest is continued, it is projected that by the end of the fourth decade only 19 acres of trees older than 200 years would be left on high intensity lands planned for harvest.

Currently there are about 11,000 acres of nonstocked and early stage (less than 15 years old) vegetation on the high intensity lands of the SYUs (Table 1-1). The creation of 31,200 additional early stage acres by clearcutting and regeneration cut of shelterwood harvest would be a 184 percent increase in this successional stage. Therefore, the potential exists for a theoretical 184 percent increase in early successional stage animals. It is unlikely that this large increase would occur due to limiting factors such as weather, predation and the location of the increased food supply caused by the increase in early successional stages.

In total, about 90,000 acres of habitat would be modified by cutting, thinning and road building. This would alter animal use and species composition on those acres. It would adversely impact some species and have a beneficial impact on others.

The possibility exists that there are some chronic effects to birds associated with the use of 2,4-D (USDI, BLM 1979). While this has not been shown to occur under field conditions it must be considered as a potential adverse impact.

Table 3-8 lists the impacts of the proposed action on those species discussed in Section 2.8. The effects listed are based on habitat requirements and may be subjective. In some instances, impacts are not known or there are conflicting reports in the literature. The impacts shown are for those individuals affected, not for the species as a whole.

Each action is divided into short and long-term effects. Short term is considered to be up to 10 years and long term in excess of 10 years. It is recognized that the immediate effects may be different from short term; however, immediate effects are not shown. An example of this is burning. Immediate effects are removal of all vegetation, but the short-term effects are different, e.g., good growth of grasses and shrubs and lush habitat for certain species.

Probably the most significant impact on fish is physical habitat alteration. This impact is impossible to quantify due to the non site-specificity of the proposed action and the unpredictability of sediment deposition in streams and lakes. Nonetheless, it is believed that the impact would be significant and adverse, because timber harvesting is known to increase stream sediment loading and the majority of stream habitats in the JKSYUs are known to be currently in poor to fair condition with the amount of

Table 3-8
Impacts of the Proposed Action on Selected Terrestrial Vertebrates

Key
0 No Identifiable Impact
? Unknown Impact
- Negative Impact
+ Positive Impact
1 Minor
2 Moderate
3 Significant
S = Short Term
L = Long Term

SPECIES	Clearcut S : L	Shelterwood S : L	Overstory Removal S : L	Single tree selection S : L	Commercial thinning S : L	Yarding S : L	Transportation S : L	Gross yarding S : L	Burning S : L	Scarification S : L	Chemical vegetation control S : L	Planting S : L	Baiting S : L	Precommercial thinning S : L	Fertilization S : L
1. Siskiyou Mountain salamander	-3 : 0	-1 : 0	0 : 0	0 : 0	? : ?	-1 : 0	+1 : +1	-1 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	0 : 0	0 : 0	0 : 0
2. Great blue heron	-3 : -3	-3 : -3	-3 : -3	0 : 0	0 : 0	-1 : 0	-1 : 0	-1 : 0	-1 : 0	0 : 0	0 : 0	+1 : 0	0 : 0	0 : 0	0 : 0
3. Goshawk	-3 : -3	-3 : -3	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
4. Bald eagle	? : 0	? : 0	? : 0	0 : 0	0 : 0	0 : 0	? : 0	? : 0	? : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
5. Osprey	-2 : -2	-2 : -2	-2 : -2	0 : 0	0 : 0	-1 : 0	-1 : 0	-1 : -1	-1 : 0	-1 : 0	0 : 0	+1 : 0	0 : 0	0 : 0	0 : 0
6. Blue grouse	+2 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	+1 : +1	+1 : 0	+1 : 0	-1 : 0	-1 : 0	-1 : 0	0 : 0	0 : 0	0 : 0
7. Ruffed grouse	+2 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	+1 : +1	+1 : 0	+1 : 0	-1 : 0	-1 : 0	-1 : 0	0 : 0	0 : 0	0 : 0
8. Mountain quail	+2 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	+1 : +1	+1 : 0	+1 : 0	-1 : 0	-1 : 0	-1 : 0	0 : 0	0 : 0	0 : 0
9. Band-tailed pigeon	+1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	0 : 0	+1 : 0	+1 : 0	-1 : 0	-1 : 0	-1 : 0	0 : 0	0 : 0	0 : 0
10. Spotted owl	-3 : -3	-3 : -3	-3 : -3	? : ?	0 : 0	0 : 0	0 : 0	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
11. Great gray owl	-1 : -1	-1 : -1	-1 : -1	0 : 0	-2 : -2	0 : 0	0 : 0	0 : 0	? : 0	? : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
12. Saw-whet owl	-3 : -3	-3 : -3	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
13. Vaux's swift	-3 : -3	-3 : -3	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
14. Calliope hummingbird	+3 : +2	+1 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	0 : 0	+1 : 0	+1 : 0	+1 : 0	-1 : 0	-1 : 0	0 : 0	0 : 0	0 : 0
15. Pileated woodpecker	-3 : -3	-3 : -3	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
16. Yellow-bellied sapsucker	-1 : -1	-1 : -1	-1 : -1	0 : 0	-1 : -1	0 : 0	0 : 0	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
17. Williamson's sapsucker	-2 : -2	-2 : -2	-1 : -1	0 : 0	-1 : -1	0 : 0	0 : 0	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
18. White-headed woodpecker	-3 : -3	-3 : -3	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
19. Black-backed three-toed woodpecker	-2 : -2	-2 : -2	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
20. Northern three-toed woodpecker	-2 : -2	-2 : -2	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
21. Tree swallow	-1 : -1	-1 : -1	-1 : -1	0 : 0	-1 : -1	0 : 0	0 : 0	-1 : -1	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
22. Clarks nutcracker	-1 : -1	-1 : -1	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
23. White-breasted nuthatch	-3 : -3	-3 : -3	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
24. Red-breasted nuthatch	-2 : -2	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
25. Pigmy nuthatch	-3 : -3	-3 : -3	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
26. Brown creeper	-2 : -2	-2 : -2	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
27. Cedar waxwing	-1 : 0	0 : 0	+1 : +1	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	0 : 0	0 : 0	0 : 0
28. Nashville warbler	+2 : +1	+2 : +1	0 : 0	0 : 0	-1 : 0	+1 : 0	0 : 0	+1 : 0	+1 : 0	-1 : 0	0 : 0	+1 : 0	0 : 0	0 : 0	0 : 0
29. Red crossbill	-3 : -3	-3 : -3	-3 : -3	-1 : -1	-1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
30. Savannah sparrow	+3 : 0	+1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	+1 : 0	-1 : 0	-1 : 0	-1 : 0	0 : 0	0 : 0	0 : 0
31. Vesper sparrow	+3 : 0	+1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	+1 : 0	-1 : 0	-1 : 0	-1 : 0	0 : 0	0 : 0	0 : 0
32. Big brown bat	-2 : -2	-2 : -2	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	-1 : -1	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
33. Least chipmunk	+3 : 0	+1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	+1 : 0	-1 : 0	? : 0	0 : 0	0 : 0	0 : 0	0 : 0
34. Western gray squirrel	-1 : 0	-1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
35. Northern flying squirrel	-3 : -3	-3 : -3	-3 : -3	0 : 0	0 : 0	0 : 0	0 : 0	-2 : -2	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
36. Red tree vole	-2 : -2	-2 : -2	-2 : -2	0 : 0	-1 : -1	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : +1	0 : 0	0 : 0	0 : 0
37. Black bear	+1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	-1 : -1	0 : 0	+1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
38. Marten	-2 : -2	-2 : -2	-2 : -2	0 : 0	-1 : -1	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	0 : 0
39. River otter	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	-1 : 0	-2 : 0	-1 : 0	-1 : 0	-3 : 0	0 : 0	+1 : 0	0 : 0	0 : 0	0 : 0
40. Mountain lion	+1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	-1 : -1	+1 : 0	+1 : 0	-1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
41. Bobcat	+2 : 0	+1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0	0 : 0
42. Feral horse	+1 : 0	+1 : 0	0 : 0	0 : 0	0 : 0	+1 : 0	0 : 0	+1 : 0	+1 : 0	-1 : 0	-1 : 0	-1 : 0	0 : 0	0 : 0	0 : 0
43. Roosevelt elk	+2 : 0	-1 : 0	-1 : -1	0 : 0	0 : 0	+2 : 0	0 : 0	+2 : 0	+2 : 0	-1 : 0	? : ?	-1 : 0	0 : 0	-1 : -1	0 : 0
44. Mule deer	+2 : 0	-1 : 0	-1 : -1	0 : 0	0 : 0	+2 : 0	0 : 0	+2 : 0	+2 : 0	-1 : 0	? : ?	-1 : 0	0 : 0	-1 : -1	0 : 0
45. Black-tailed deer	+2 : 0	-1 : 0	-1 : -1	0 : 0	0 : 0	+2 : 0	0 : 0	+2 : 0	+2 : 0	-1 : 0	? : ?	-1 : 0	0 : 0	-1 : -1	0 : 0

available habitat decreasing. While fish may continue to use these streams, a decline in productivity and population vigor would result from increased sediment levels. Potential for adverse impacts would be greater in headwaters and small streams than in the mainstem of the Rogue or Klamath Rivers.

The proposed action would have no significant impacts on any species listed by the Federal Government as Threatened or Endangered. Nor would there be any significant adverse impacts on any animal species or its habitat covered by International Treaty.

The northern spotted owl is the only species listed as threatened by the State of Oregon that would be adversely impacted. A decline in their numbers is probable. However, the species as a whole would only be moderately affected.

3.7 IMPACTS ON RECREATION

Most timber management activities alter those specific satisfying experiences that are desired from the chosen recreation activities. Timber harvest and accompanying road construction, traffic and noise can severely impact some recreational values. Some recreation activities, however, can be enhanced by timber management activities.

When timber harvest activities take place near recreation sites, the recreation experience could be degraded by noise, odors, and even the sight of timber management activities. High intensity lands are within view from most of the inventoried recreation sites. Some sales proposed in the 3-year timber sale plan are near recreation sites within the ES area (see Table 3-9).

In general, any activity adversely affecting the recreational experience could cause a reduction in the number of visitor days. Reductions could be temporary, occurring during actual harvest, or of many years duration if the desired recreation experience has been heavily degraded.

Recreation management opportunities (Table 2-13) for sightseeing, hiking and backcountry experiences would be impacted when timber harvest activities are apparent. The 3-year timber sale plan indicates that evidence of timber harvest would be apparent from the Pacific Crest, Sterling Mine Ditch, Butte Creek and other trails as well as from highways and areas of higher elevation (Table 3-9).

Inventoried potential recreation sites with high intensity timber management lands (see Figure 2-9) would be protected from timber harvest pending a review of their suitability for development (see Table 1-6, Issue VIII).

An analysis of the 3-year sale plan indicates that five potential recreation sites are within areas of proposed timber sales (see Table 3-9). These five sites contain about 530 acres of high intensity lands and about 80 acres of limited management lands. Should these sites be found not suitable for

Table 3-9

Conflicts Between Three-Year Timber Sale Plan and Recreation Sites, Activities, and Opportunities

RECREATION SITES 1/	POSSIBLE CONFLICTING TIMBER SALES (3-YEAR SALE PLAN)
BLM	
Kenny Meadows	81-22, 82-18
Little Applegate	81-22
Battle Creek (closed)	81-17
Elderberry Flat	81-18
Hyatt Lake	80-2, 80-9
State of Oregon	
Tubb Springs	81-6
Jackson County	
Cantrall Buckley	81-21
Hooper Springs	80-2
Howard Prairie Sites	80-10, 81-9
RECREATION ACTIVITIES	
Hiking	
Tunnel Ridge Trail	81-22
Pacific Crest Trail	80-6, 80-7, 80-8, 80-9, 80-10, 81-8, 82-2, 82-5
Collecting	81-4, 81-22
ORV Use	80-2, 80-7, 80-8, 80-9, 80-10, 80-18, 80-19, 80-21, 81-6, 81-9, 82-5, 82-22
Sightseeing	
Botanical	80-10, 81-16, 81-17
Zoological	81-4
Snowplay	80-2
Snowmobiling	81-6, 82-8
Cross-Country Skiing	80-2, 80-9, 80-10, 81-9
RECREATION MANAGEMENT OPPORTUNITIES	
Butte Creek (fishing, hiking)	81-11
Grizzly Peak (hiking, backcountry recreation)	82-3
Hyatt Lake (year-round recreation)	80-2, 80-10
Buck Point Trail (hiking between Emigrant Lake and Pacific Crest Trail)	80-7, 80-8, 80-9, 81-8, 82-5
POTENTIAL RECREATION SITES	
Raspberry Creek (T34S, R3W, Sec 15)	81-17
Greensprings Highway (T39S, R5E, Sec 31)	82-4
Titanic (T34S, R3E, Sec 25)	82-14
Fredenburg (T35S, R2E, Sec 3)	81-11
Thompson Creek (T39S, R5W, Sec 25)	81-20

1/ Sales would be within 1 mile of recreation site.

recreation development at the time of proposed timber sale, their future potential as recreation sites, if any, would be lost as a result of timber harvest.

Other unidentified potential recreation sites or small tracts with primitive or roadless characteristics may be destroyed as a result of some timber management activities. A discussion of the impacts of the proposed action to potential wilderness areas can be found in Section 3.10.

3.7.1 Management Practices

Each management practice listed in Table 1-1 would impact, to varying degrees, the experiences desired by recreationists. A management practice could enhance the experiences desired in certain outdoor activities, but the practice could be adverse to other experiences. These differences will be pointed out in the following discussion. Table 3-10 summarizes these impacts. The quantification of changes in visitor days is not possible with existing data. Table 3-9 identifies conflicts between the 3-year sale plan and specific recreation activities.

The proposal includes three harvest methods. Single tree selection would have the least impact on those recreation activities related to appreciation of environmental qualities. Clearcutting would have the greatest impact on these activities. Clearcut areas would provide wildlife habitat, potentially increasing opportunities for hunting, wildlife viewing and photography. Dispersed recreational use, collecting and berrypicking would also be enhanced. Following the regeneration cut in a shelterwood system, areas would exhibit some aspects of a natural environment until the final harvest cut takes place. During the interim, opportunities for hiking, birding, nature study and photography would be enhanced in the open residual stands. Following the final harvest cut, such an area would be similar in character to a clearcut but with conifer reproduction in place.

Yarding alters the recreational experience by creating noise and odors. Tractor yarding would create more impacts than cable yarding. Tractor yarding could produce areas for hiking as a result of the movement of felled timber over the ground's surface.

Construction of 375 miles of new road would provide more access for dispersed recreation. New roads would serve to disperse recreationists and reduce the present level of impacts upon facilities and recreational experience. Hikers and backpackers might also benefit by gaining quicker and greater ease of access to undeveloped area trailheads. Extending the network of logging roads could possibly decrease recreational enjoyment by creating additional traffic, noise, dust, fumes and decreased visibility.

Fishing success and water sports could be adversely affected as a result of siltation, eutrophication and changes in water quality which would result from some timber management practices and road construction. Section 3.4.2

Table 3-10

Summary of Impacts to Recreation Activities 1/

Desired Experiences and Activities 2/	Timber Management Activities: Harvest Systems	Yarding	Road Construction
Appreciation of Environmental Qualities			
Hiking	-	+ -	+ -
Camping	-	-	+ -
Picnicking	+ -	-	+ -
Sightseeing (specific)	+ -	-	-
Nature study	+ -	-	-
Photography	+ -	-	+
Cross-country skiing	-	+	+
Horse use	-	+	+
Climbing	-	0	+
Wilderness experience	-	-	-
Extraction of "trophies" from the environment			
Hunting	+	+	+ -
Fishing	-	-	+ -
Photography	+	0	+
Collecting	+	0	+
Activity-oriented recreation			
ORV use	+	+	+
Water sports	-	-	-
Outdoor games	0	0	0
Snowmobiling	+	+	+
Climbing	0	0	0
Activities requiring little effort			
Painting	-	-	-
Relaxing	0	0	0
Sightseeing (general)	-	0	+ -
Social activities involving interaction			
Nature study	+ -	-	+ -
Social camping	+	-	+ -

1/ Impacts are classified as beneficial (+), adverse (-), or none (0).

2/ The analysis of impacts to recreational activities and the desired experiences of participants is based upon the following research: Bassett et al. 1972; Ditton and Goodale 1972; Driver 1975; Hendee et al. 1971; Journal of Forestry 1968; Knopf 1972; Phillips 1971; Stevens 1966.

concludes that significant adverse impacts to water quality may occur in localized areas, particularly small streams. Reservoirs and other recreational water bodies may be subject to localized adverse impacts to recreation quality. All reservoirs in the area receive recreation use (Appendix G, Table G-1). Ditton and Goodale (1972) indicate that a 1 percent change in water quality would adversely affect recreationists participating in water contact sports and swimming more than those fishing or boating.

As turbidity increases above 25 parts per million, fishing success declines (Phillips 1971). Based upon estimates of sediment yield increases, localized increases in turbidity are expected. This would result in a loss of sport fishing since some types of fishing are responsive to changes in success (Stevens 1966).

Table 2-9 illustrated that about 74,800 angler visits were attributed to public lands in 1975. Bassett et al. (1972) identified the percentage of anglers that value certain desired experiences as extremely or very important. In a worst case analysis, as many as 60,000 or 80 percent of annual angler visits to public lands could be lost as timber management activities impact the desired experiences to enjoy the out-of-doors, encounter a restful environment, breathe fresh air and escape city noise. Many anglers may go elsewhere and problems associated with visitor use and congestion could occur. It is very unlikely, however, that this great a sum of angler visits would be lost.

3.7.2 Conclusions

The impacts of timber management operations would be both beneficial and adverse, depending on the recreational experience desired. In many cases, timber management activities would result in additional areas for the pursuit of certain recreational activities (i.e., dispersed activities, hunting, berrypicking, photography). Some areas may be more accessible as a result of timber management operations and may benefit certain categories of recreationists (i.e., dispersed area or back-country users).

The adverse impact of timber management activities upon the recreation resource would be most significant to recreationists that desire and expect to experience a pristine environment. This category of recreationist participates in activities or enjoys knowing opportunities exist for activities directed toward appreciation and preservation of environmental features (i.e., seeing natural scenery, climbing, birding, nature study, photography).

While impacts to specific recreational groups would be significant, total recreational use is not expected to be significantly impacted. Visitor day reductions due to adverse impacts upon recreational experiences would tend to balance increases in visitor days in activities which would be beneficially impacted.

The projected recreation demand increase of 130 percent (see Section 2.9.2) would still occur. Based on this increase, long-term impacts would increase in significance.

3.8 IMPACTS ON CULTURAL RESOURCES

Complete field surveys of the JKSYUs to identify paleontologic and archeologic sites have not been undertaken. Each proposed ground-disturbing activity, however, would be preceded by a complete field survey of cultural resources as part of the environmental assessment reports which precede each site specific timber sale (BLM Manual 8100, Cultural Resource Management). Protection would be provided in accordance with the National Historic Preservation Act of 1966 and Executive Order 11593, as stated in the Code of Federal Regulations (36 CFR Part 800). There is still some chance of unidentified cultural resources being inadvertently impacted, however.

It is not possible to professionally estimate the number of unidentified sites that could be impacted. Unidentified cultural resources could be impacted due to compaction of soil, disturbance of the ground surface, and alteration of the soil's chemical properties by fire, chemical treatment, or addition of organic matter. Most of the SYUs is largely unsurveyed for archeological sites. Oregon Department of Transportation (1978) indicates that a medium archeological site density occurs in northern Jackson County and western Klamath County. It is expected that the potential for archeological site disturbance would be greater in areas of medium site density than where site density is low.

Soil compaction and surface disturbance during any ground manipulation activity would disrupt vertical and horizontal relationships of cultural deposits. The context of archeological resources would be altered and preservation of data would be affected. Paleoecological data would be disturbed or lost. Furthermore, ground disturbance could be expected to cause extensive artifact loss, breakage and churning. The negative effects of surface disturbance upon cultural resources have been documented by many sources, such as DeBloois, Green and Wylie (1974). Both surface lithic sites and sites with structures or subsurface components would be damaged, though the extent of damage to subsurface components would be less.

Quantification of the magnitude of impacts to unidentified archeological sites is not possible. For example, on some sites, a 0.7 percent severe surface disturbance would be intolerable; on others, perhaps 100 percent severe surface disturbance would not constitute an adverse effect because archeological values are confined to subsurface deposits (Wildesen 1977). Duration of impacts would be permanent, because neither broken lithic materials nor their original surface distribution can be restored once altered.

Chemical alteration of sites, materials and soil usually occurs after harvest activities are complete, during slash disposal and site preparation. Fire would destroy combustible items, adversely alter stone ceramic artifacts by introducing color, textural and thermal radiation changes. Charcoal would contaminate Carbon 14 dating samples and pollen. These data sources would become unreliable for scientific information. The addition of organic matter would also alter the soil's chemical properties.

The proposed construction of 375 miles of road would provide access to cultural sites, resulting in increased visitation. Vandalism, looting, site damage and site erosion could result. Esthetic, recreational, interpretive and educational qualities of the sites could be degraded.

The alteration of the landscape and vegetation in proximity to some cultural sites would create impacts. The disturbance of a site's visual setting would reduce its esthetic, recreational, interpretive and educational potential. Table 3-11 identifies four known sites which may have visual setting impacts as a result of timber sales proposed in the 3-year sale plan. VRM program constraints would be complied with to greatly mitigate adverse impacts to site settings.

Table 3-11

Timber Sales Proposed in Three-Year Sale Plan
Within One Mile of Cultural Resources

Archeological Sites	Sales Within One Mile
35-AR-11-5	80-9, 80-10, 81-9
35-AR-11-16	81-11
Historical Sites	
Sterling Mine Ditch	81-22
Brush Mountain Lookout 1/	80-6, 80-7, 80-8, 80-10, 81-8, 81-9, 82-5

1/ Conflicting sales listed are within 5 miles of the lookout.

Insofar as old-growth trees could be considered a type of "living history", the harvest of this old growth could be construed as destruction of historical values.

There are no impacts anticipated to the Jacksonville Historic District which is currently listed on the National Register.

Those portions of the Rancheria Trail, Topsy Road and Applegate Trail on public land which have been nominated or will be nominated to the National Register would not be impacted. These sites will be managed for protection and enhancement of cultural values. There is some possibility of impacts to the visual settings in proximity to the trails. Interpretive, educational, esthetic and recreational potential would only slightly decrease.

3.9 IMPACTS ON VISUAL RESOURCES

Most timber management practices disrupt land surface, change surface vegetation and create contrasts to the existing environment. Alterations of the

landscape may be beneficial or adverse, short term or long term. Virtually all timber management practices impact visual resources by creating evidence of human presence and disturbing previously undisturbed areas.

As the number of recreationists and viewers increase, the visual impacts of a management activity also increase. A demand increase of 103 percent for pleasure driving and sightseeing is anticipated between 1970 and 1990 (Oregon Department of Transportation 1972). The extent of impacts upon visual resources can therefore be projected to increase in direct relation to increased future pleasure driving and sightseeing demands. Additionally, should attitudes or tastes change and viewers decide to prolong the duration of their viewing, the visual impacts of a management activity also increase.

3.9.1 Cutting Practices

It is widely accepted that the selection method is the least disruptive of all silvicultural harvesting techniques (Cook 1968; Douglas 1965). Clearcutting, however, is considered to have significant adverse impacts on esthetic values (Marshall 1925; Smith 1962; Douglas 1965). Within the JKSYUs, there is little natural variation in the vegetative pattern. Simple and uniform textured vegetation is highly vulnerable to impacts of disruption. For this reason, clearcutting would create strongly contrasting geometric forms and vegetative texture groupings on the 4,000 acres to be clearcut. Clearcut units adjacent to forested landscape would produce long-term impacts upon the visual resource.

The falling of merchantable timber through a two-stage shelterwood cutting system would also result in long-term landscape alterations.

The first stage of a shelterwood cut would not impact the visual resource as drastically as clearcutting would. Upon completion of the second harvest cut of the two-stage shelterwood system, impacts upon the visual resource would be comparable to those resulting from clearcutting. Approximately 60,000 acres would be harvested through a two-stage shelterwood system. This includes 10,500 acres in which the overstory would be removed, leaving a well-stocked understory.

Thinning operations on approximately 35,000 acres would produce short-term impacts upon the visual resource. Esthetic value is proportional to depth of view (Methven 1974). Thinning could be effectively used to enhance the environment by increasing depth of view or by changing form, line, texture, color and vegetative groupings. These long-term enhancements may result in incidental short-term adverse impacts.

3.9.2 Yarding

Vehicle operation associated with yarding would produce short-term and long-term alterations of landscape character. These impacts would be mainly

disturbance of soil and surface vegetation. Ground support yarding systems tend to result in greater areas of severe disturbance of soils per total area logged than do aerial support systems (including skyline). Soils in the JKSYUs are highly reflective of light when disturbed.

3.9.3 Road Construction

Impacts would be both adverse and beneficial. Due to soil colors in many areas of the JKSYUs, road construction would create strong long-term landscape contrasts. Road construction and maintenance could benefit the visual resource by providing scenic access and panoramic views, and by focusing attention on specific scenic features.

Wilderness enthusiasts feel that roads reduce the esthetic value of an area, not primarily because of the roads′ appearances, but because they permit people who have little or no appreciation for wilderness values to enter into previously inaccessible areas. They bring in litter, noise and all the trappings of civilization that accompany people (Cook 1969). On the other hand, the fact that roads do allow more people to view more forest landscape is considered by some to be a benefit in itself (Gruffyd 1964; Olmsted 1967; President′s Council on Recreation and National Beauty 1968).

3.9.4 Development and Protection Practices

Burning, fertilization and herbicide application would produce both short-term adverse impacts on and long-term enhancement of the visual resource. Scarification would result in short-term disturbances of surface vegetation and soil. Fertilization would benefit the visual resource by providing healthier trees. The application of herbicides would control herbaceous or woody vegetation prior to or following seeding or planting. The dead vegetation resulting from chemical weed and brush control would create highly visible adverse effects on over 29,000 acres.

Smith (1962), Methven (1974) and Schweitzer et al. (1976) refer to unsightly accumulations of slash as an obvious and generally negative consequence of most harvesting methods. Visible or obstructive slash, along with smoke associated with burning are considered esthetically objectionable. Section 3.2 deals with impacts of timber management operations upon air quality and visibility. (Table 3-1).

The degree of impact to the visual quality of the landscape depends upon the amount of visual contrast that is created between the management activity and the existing landscape character. The amount of contrast between a proposed activity and the existing landscape character can be measured by separating the landscape into its major features (land and water surface, vegetation and structures), and then predicting the magnitude of change in contrast of each of the basic elements (form, line, color and texture) for each of the features.

Contrast rating is applied to all proposed land management activities which disturb the soil, change or remove vegetation, or place a structure in the landscape. It is applied to all areas needing rehabilitation or enhancement. Environmental assessments deal with the application of the contrast rating system to specific timber sales. These assessments would also discuss visual impacts to the 16 residences (including 3 summer homes) within 1 mile of timber sales in the 3-year timber sale plan.

Assessing the amount of contrast for a proposed activity can give a good indication of the severity of impact and serve as a guide in determining what is required to reduce the contrast to the point where it will meet the criteria for the visual resource management classes of the area (BLM Manual, Visual Resource Management 6300). Visual resource management (VRM) classes for the JKSYUs are described in Chapter 2, Section 2.11.

Approximate acreages of public lands within each VRM class are as follows:

VRM Class	Public Land Acreage	Approximate Percent of Public Land
I (potential)	480	less than 1
II	72,340	15
III	98,980	20
IV	316,250	65
V (to be rehabilitated)	210	less than 1
TOTAL	488,260	100

The impacts of timber management activities upon VRM Class I lands would be nonexistent as timber harvest is not planned on such lands. The impacts of timber management activities upon VRM Class II, III or IV land could be insignificant, moderate or severe, depending upon amount of contrast created. Where the impact is either moderate or severe, the contrast rating would be used to determine the most effective means of mitigating the impact in accordance with the VRM class requirements of the area.

Only about 15 percent of the public lands are classified as VRM Class II. Timber management actions would be designed on these lands so that impacts within this class would be virtually nonexistent. There is a slightly greater chance of adverse impacts occurring in VRM Class III lands. Should adverse impacts occur, the majority of them would be within VRM Class IV lands.

An analysis of the 3-year timber sale plan indicates that 66 percent of the cutting during that period would be within VRM Class IV areas. The cutting areas can further be defined as shown in Table 3-12.

Table 3-12

VRM Classes Affected by Three-Year Timber Sale Plan

VRM Class	Approximate Acreage to be Harvested	Percent	Approximate Acreage by Cutting Practice: Clearcut Acres Cable	Clearcut Acres Tractor	Partial Cut Acres Cable	Partial Cut Acres Tractor
IV	16,690	66	608	152	4,745	11,185
III	6,973	27	60	127	2,338	4,448
II	1,678	7	185	20	490	983
TOTAL	25,341	100	853	299	7,573	16,616

3.9.5 Conclusions

Silvicultural practices, vehicle operation associated with yarding, blasting, excavation and road construction would create significant long-term landscape alterations. Slash burning, thinning operations, vehicle operation associated with yarding and loading, and development and protection practices would create significant impacts in the short term.

The BLM's contrast rating system would be applied to each specific timber sale to assess the severity of impact of the proposed activity. The most effective means of mitigating the impact would be determined, and the BLM would attempt to make the proposed project meet the VRM class requirements of the area.

3.10 IMPACTS ON WILDERNESS VALUES

The initial inventory of roadless areas and islands within the JKSYUs identified the 6,100 acre Soda Mountain area for an intensive inventory to determine if it has wilderness characteristics. During the period of review of this area, and until determined otherwise, this area will be managed so as not to impair its suitability for preservation as wilderness. Should any other area of the JKSYUs have wilderness characteristics, these values would be lost as a result of timber harvest and related activities.

3.11 IMPACTS OF NOISE

Timber management activities would have substantial auditory impacts. While only temporary noise sources, motorized vehicles and equipment would greatly impact the quality of the forest experience. The decibel range for chainsaws at 50 feet is about 75-96 dBA and the range for skidders is about 74-92 dBA (Harrison 1974). Chainsaw and skidder activity produce great

variations in frequency. Figure 3-1 compares octave-band noise levels for all logging machines tested in Myles' Canadian Forestry Service study (Myles et al. 1971). In the average situation, chainsaws and skidders can be heard at a distance of about 1.45 miles with a standard deviation of half a mile. Both chainsaws and skidders should be inaudible 50 percent of the time at 1.5 miles and inaudible 85 percent of the time at 2 miles (Myles et al. 1971). Certain topography or atmospheric conditions could easily increase this distance (Harrison 1974).

Within portions of the ES area, differing background noise levels and noise reduction factors would result in varying degrees of impacts and require different spacing requirements to control noise intrusiveness. Furthermore, the impacts of noise depend upon visitors' expectations of solitude and isolation and quality of forest experience. In many cases, forest users are most affected by a sound's connotation, rather than its level or duration (Parry and Stephens 1969).

The Canadian Forestry service study provides a firm technical basis to justify a point at which mechanized logging operation noise would still be acceptable to other forest users. The study concludes that, in order to produce little or no auditory impact, logging operations should not be permitted closer than a mile from the location of a listener (Myles et al. 1971).

An analysis of the 3-year timber sale plan indicates that 16 residences (including 3 summer homes) are within 1 mile of the proposed timber sales. Auditory impacts to these residences would be moderately significant.

3.11.1 Conclusions

Intrusive sound would have significant adverse impacts upon forest visitors for the duration of the noise. Noise created by timber management activities would most significantly impact those forest visitors with high expectations for solitude or isolation. Noise with unpleasant connotations create the most significant adverse impacts in this case. When the desire and expectation for solitude is not so great, the impacts of noise may be more dependent on the physical properties, intensity, frequency and intermittent recurrence of the noise.

3.12 IMPACTS ON GRAZING

In the JKSYUs, approximately 402,000 acres are leased for livestock grazing. Figures are unavailable on how much public land leased for grazing is in the commercial forest base. Since only a small portion would be involved in a timber sale or regeneration project in any one year or grazing season, impacts from these treatments are minimal. On an individual basis, a timber sale or regeneration program could have a considerable impact on a small or marginal grazing lessee.

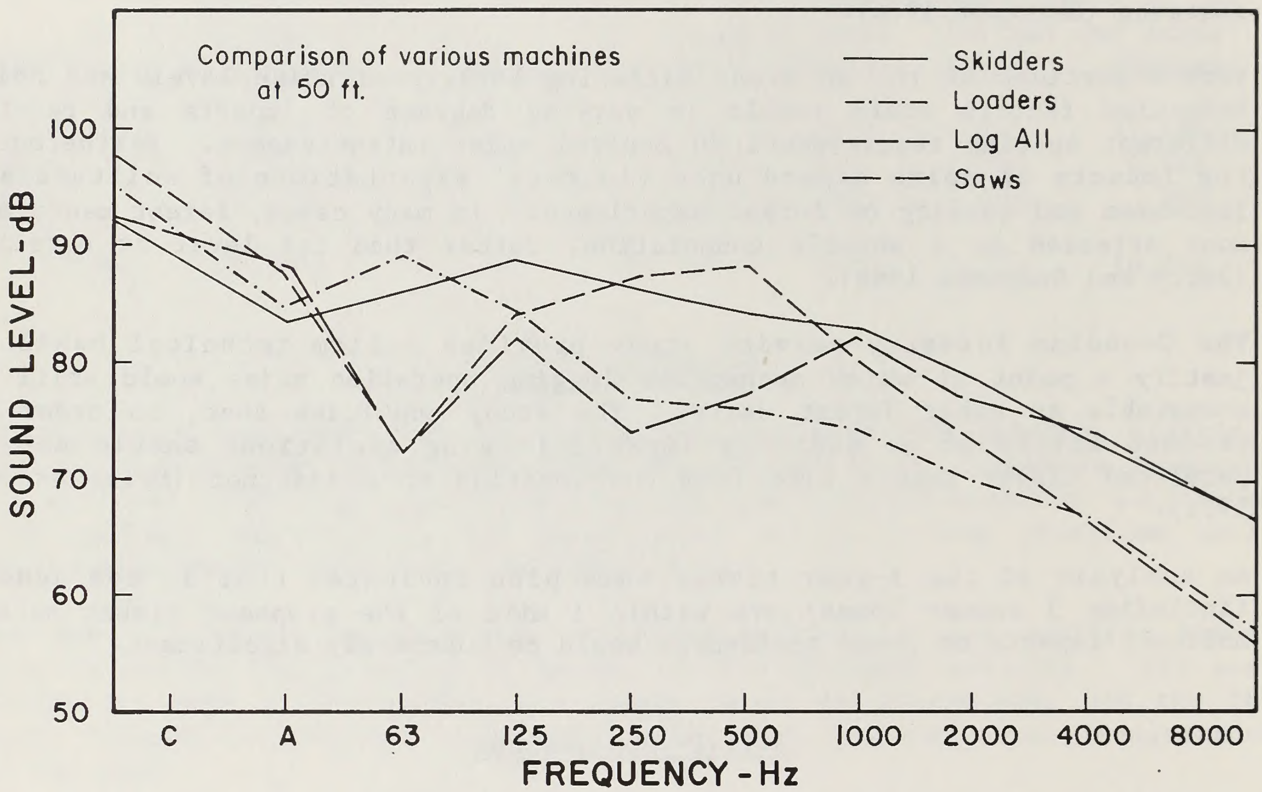


Figure 3-1 COMPARISON OF OCTAVE BAND SPECTRA FOR ALL MACHINES AT 50 FEET
SOURCE: Myles, et al. 1971

Use of atrazine in the control of grass within planting areas (site preparation or release) creates a direct impact on existing grazing. Label instructions for atrazine require removal of domestic livestock from the treated area for 1 year. Of the 8,300 acres scheduled for atrazine, it is probable that all would be in areas where grazing is permitted. It is unknown what methods would be used to exclude cattle from treated areas. Possible methods include temporary fencing, canceling or amending grazing leases to delete treated areas, or requiring the lessee to ride the area daily to herd stock away from treatment sites. Alternative chemicals could also be used in lieu of atrazine.

Worst case situation analysis discloses several general ways in which grazing could be impacted. It is highly unlikely that any of them would be significant either individually or in combination. Possible impacts include the following:

- Road construction removes forage vegetation. Dust from road traffic makes forage less desirable. Roads, however, provide access to additional forage areas. Animals on the roads are a traffic hazard.
- Dragging logs, slash burning, herbicide usage and scarification remove forage at least temporarily.
- Logging slash, prior to slash disposal, reduces livestock access to forage and increases the possibility of leg injury to foraging animals.
- Burning, herbicide spraying, scarification, regeneration planting and fertilization can result in changes in the herbaceous and shrub vegetative layers which affect the quality and palatability of forage.
- Reforested areas may be fenced to protect the seed or seedlings from animal damage, including livestock. These areas would be lost to grazing for at least 5 years.

3.13 IMPACTS ON MISCELLANEOUS LAND USES

3.13.1 Transportation and Utility Networks

Construction of 375 miles of new roads would obviously change the land use from forest to transportation. However, the overall land use category is timber management; logging roads are a part of that land use category. Thus, impacts to the land use category would not occur.

Construction or reconstruction of approximately 375 miles of permanent road during the proposal period may increase traffic volume and alter traffic patterns in existing roads. Changes would be attributable to both timber management and recreation seekers bound for newly opened areas.

Safety hazards would result from increased vehicle numbers, dust and noise. Impacts of recreational use on forest areas made accessible by the new roads are discussed in Section 3.7.2.

Traffic volume on existing transportation routes may also be affected. The proposed reduction in allowable cut could cause a reduction in the number of logging trucks on secondary highways. This should result in minor beneficial impacts to road conditions.

3.13.2 Mining

Construction of roads would require quarry products and should result in a demand for gravel. Impacts of any change in land use are unknown. Present rock sources are plentiful and considered adequate for future needs.

3.13.3 Ecologically Significant Areas

No impacts are expected to those areas nominated or planned to be nominated as research natural areas. These include the Surveyor, Lost Lake and Upper Table Rock areas. No impacts are expected to the Hollenbeck area, which is managed as an environmental study area.

Ecologically significant areas identified by the Oregon Natural Heritage Program (Nature Conservancy) were analyzed based upon the TPCC status of public lands within the area boundaries identified by the Nature Conservancy (1977; 1978). Visual resource management and other program constraints were also examined to determine the potential adverse impact to public land within these ecologically significant areas. Certain areas are being studied for potential research natural area designation. If it is determined that an area has potential, it would be protected. The following analysis, however, is based upon impacts in the worst case (i.e., that no area has potential for research natural area designation).

The ecological and biological merits of certain areas would be adversely impacted as a result of timber management operations. Impacts would include destruction of vegetation, soil compaction, erosion and, in some cases, destruction of unique animal or plant species. Many of the areas identified by the Oregon Natural Heritage Program contain high intensity timber management land. Impacts would be most severe in those areas. In some cases, VRM constraints would serve to mitigate impacts to ecologically significant areas.

Table 3-13 summarizes the impacts to ecologically significant areas. The cumulative impact to Siskiyou Mountain salamander populations at Nine Mile Creek, Hinkle Gulch, Black Ben (Negro Ben) Mountain, Lower Star Gulch, Upper Grouse Creek and Upper Star Gulch could be severe (see Section 3.6.4). Adverse impacts to Jenny Creek itself and Jenny Creek sucker habitat would be moderate. The Jenny Creek sucker, however, is not on any State or Federal

Summary of Impacts to Ecologically Significant Areas

Area[1/]		TPCC Status of Public Lands within Area Identified	Degree of Potential Adverse Impact on Public Land	Remarks	Poasible Conflicting Timber Salea (3-year Sale Plan)
JA-8	Hobart Lake	Lake bordered on S&E by high intensity	Minimal	Land in proximity to lake is VRM Class II.	
JA-9	Rancheria Meadows	160 acres of high intensity	Moderate	Impacts to marshland would be minimal-moderate.	82-12
JA-10	Pilot Rock	320 acres high intensity; 160 acres other	Moderate-Severe	Unique population of <u>Sisyrinchium</u> <u>californicum</u> identified by Nature Conservancy 1977. Not confirmed by BLM.	
JA-13	Siskiyou Pass	400 acres of other	None		
JA-15	Agate Desert	40 acres of other	None		
JA-17	Flounce Rock	160 acres high intensity; 160 acres limited; 320 acres other	None	Area fenced and protected.	
JA-18	Lower Table Rock	120 acres limited; 120 acres other	None	Protected pending completion of research natural area suitability study.	
JA-21	Agate Flats	40 acres of other	None		
JA-23	Pinehurst Meadows	40 acres high intensity; 40 acres limited; 320 acres other	Minimal		
JA-28	Jenny Creek	1,200 acres high intensity; 80 acres limited; 640 acres other	Severe	Impacts to creek itself and Jenny Creek sucker habitat would be moderate.	
JA-29	Grizzly Peak	Peak itself bordered by low intensity and other; 160 acres high intensity; 40 acres limited; 80 acres low intensity; 120 acres other	Moderate		
JA-54	Nine Mile Creek	100 acres low intensity; 60 acres high intensity	Minimal		81-20
JA-55	Hinkle Gulch	160 acres high intensity	Moderate		
JA-56	Black Ben Mountain	Mountain bordered by high and low intensity land	Minimal	Area is VRM Class V (to be rehabilitated).	81-21
JA-57	Lower Star Gulch	100 acres high intensity; 60 acres low intensity	Moderate		
JA-58	Upper Grouse Creek	80 acres high intensity; 80 acres low intensity	Moderate	Not likely to be harvested within 10 years.	
JA-60	Upper Star Gulch	30 acres low intensity	Moderate		
JA-61	Lost Creek & Floras Creek	240 acres high intensity; 80 acres other	Moderate	Area is VRM Class II.	
JA-64	Howard Prairie Reservoir	960 acres high intensity; 160 acres limited; 107 acres withdrawn for recreation	Moderate	Impacts most severe in Sections 29 and 32; Impacts to waterfowl wetland would be minimal.	81-9
JA-65	Hyatt Lake Reservoir	80 acres high intensity; 240 acres withdrawn for recreation	Minimal	Long term goal for VRM Class II.	
JA-85	Jenny Creek near Rattlesnake Spring	20 acres high intensity; 20 acres limited	Minimal		
JA-86	Jenny Creek aouth of Shoat Spring	240 acres limited	None		
KL-9	Buck Lake	480 acres high intensity; 160 acres other	Minimal	Sec. 23 protected as potential recreation area.	
KL-74	Bear Valley	7,360 acres high intensity; 2,080 acres low intensity; 960 acres limited; 800 acres other	Minimal	The 5,200 acre Bear Valley National Wildlife Refuge (U.S. FWS) is a protected area within this larger area. This eagle sanctuary is most significant and would not be impacted. Impacts to eagles in adjacent areas would be minimal.	81-5; 81-5; 82-7
Surveyor (nominated as a research natural area)			None		
Lost Lake (nominated as a research natural area)			None		
Upper Table Rock (to be nominated as a research natural area)			None		
Hollenbeck (managed as environmental study area)			None		

1/ Location number from Nature Conservancy 1977; 1978.

list of threatened or endangered species. The Oregon Natural Heritage Program has reported an unverified sighting of Sisyrinchium californicum at Pilot Rock (Nature Conservancy 1977). Although the BLM has not confirmed the existence of this plant, it could be severely impacted by harvest operations if it does occur. Sisyrinchium californicum is listed as a plant species of undetermined status on the Provisional List of Rare, Threatened and Endangered Plants in Oregon (March 1977).

An analysis was carried out based upon ecological values and locations as identified by the Nature Conservancy (1977; 1978) and the 3-year timber sale plan. Locations given by the Nature Conservancy are limited in most cases to township, range and section. There are possible minimal conflicts between timber sales and five ecologically significant areas: Rancheria Meadows, Nine Mile Creek, Black Ben Mountain, Howard Prairie Reservoir and Bear Valley. While timber harvest is not planned directly on sensitive sites, general impacts to the areas may be moderate depending upon degree of vegetative disturbance, soil compaction and erosion in proximity to the significant area.

3.14 IMPACTS ON SOCIOECONOMIC CONDITIONS

The economic impacts addressed in this section reflect a comparison of different amounts of timber harvested and processed as well as local impacts related to intensive forest development practices. Most of the employment and income effects related to timber processing outside of the JKSYUs, would occur in Grants Pass, Glendale or Klamath Falls.

Table 3-14 compares the short- and long-term effects of current management with those of the proposed management.

3.14.1 Short-Term Timber Harvest Impacts

The 1974-76 average annual timber harvest from the JKSYUs was approximately 132 MM bd. ft. It is assumed that the average annual timber harvest under current management is 128 MM bd. ft. and the proposal's short-term annual timber harvest would be approximately 120 MM bd. ft.

For analytical purposes, the short-term impacts of the proposed action are compared to both the estimated impacts of the 1974-76 average annual harvest and to projected 1980 impacts of current management because of changes in factors independent of the proposed action, e.g., declining number of employees per million board feet of timber harvest and declining total timber harvest within the Medford timbershed.

The proposal's impacts would stem from an annual BLM timber harvest during the first decade that would be a projected 8 MM bd. ft. less than under current management. The amount of timber processed would be approximately 6.1 MM bd. ft. less in Jackson County, 1.3 MM bd. ft. less in Josephine

Table 3-14

Annual Effect on Selected Economic Variables of Current and Proposed Timber Management in the Jackson and Klamath Sustained Yield Units

Economic Variable	Units	Current Management: Base 1974-76 Average	Current Management: Projected Short-Term (1980)	Current Management: Projected Long-Term (1990)	Proposed Management: Projected Short-Term (1980)	Proposed Management: Projected Long-Term (1990)	Comparison of Proposed to Current Management: Short-Term % Difference	Comparison of Proposed to Current Management: Long-Term % Difference
Average Annual Timber Harvest 1/								
BLM Timber	MM bd. ft	132	128	128	120	115	-7	-11
All Sources (Timbershed)	MM bd. ft		609	599	601	586	-1	-2
Employment (Direct)								
Local Total 2/	Jobs	990	850	760	860	730	+1	-4
Timber	Jobs	990	850	760	860	680	-5	-11
Douglas Co. 5% 3/	Jobs	50	40	40	40	30		
Jackson Co. 76% 3/	Jobs	780	680	600	640	540		
Josephine Co. 16% 3/	Jobs	130	110	100	110	90		
Klamath Co. 3% 3/	Jobs	30	20	20	20	20		
Forest Development (Jackson Co.)	Jobs	0	0	0	50	50		
Non-Local	Jobs	120	80	70	80	70	-7	-11
Employment (Direct & Indirect)								
Douglas Co. E.M. = 1.56 4/	Jobs	80	60	60	60	50		
Jackson Co. E.M. = 1.84 4/	Jobs	1,430	1,250	1,100	1,260	1,080		
Josephine Co. E.M. = 2.00 4/	Jobs	260	220	200	210	180		
Klamath Co. E.M. = 1.64 4/	Jobs	40	40	30	30	30		
Total Local	Jobs	1,810	1,570	1,390	1,560	1,320		
Total Non-Local E.M. = 1.82 5/	Jobs	230	150	130	140	120		
Total Direct & Indirect	Jobs	2,040	1,720	1,520	1,700	1,440	-1	-5
Income (Direct) 6/	($1,000,000)							
Douglas Co. 14120	"	.8	.7	.7	.6	.6		
Jackson Co. 13560	"	11.7	10.4	9.5	10.5	9.4		
Josephine Co. 13090	"	1.9	1.7	1.5	1.6	1.4		
Klamath Co. 14180	"	.4	.4	.3	.3	.3		
Total Local	"	14.8	13.2	12.0	13.0	11.7	-2	-3
Total Income (Direct plus Indirect) 7/								
Douglas IM=1.53	($1,000,000)	1.2	1.0	1.0	1.0	.9		
Jackson 1.74	"	20.4	18.1	16.6	18.3	16.3		
Josephine 1.91	"	3.7	3.2	2.9	3.0	2.6		
Klamath 1.58	"	.6	.6	.5	.5	.5		
Total Local 6.76	"	25.9	22.9	21.0	22.8	20.3	0	03
Public Revenues								
O&C Counties .5 8/	($1,000,000)	3.7	9.9	13.1	9.2	11.7	-8	-12
S.W. Oregon .311 8/	"	2.3	6.1	8.1	5.7	7.3		
Jackson County .08 8/	"	0.6	1.5	2.0	1.5	1.9		
Tax Rate Equivalence of O&C Payment								
O&C Area		.14	.28	.37	.26	.33	-8	-12
Douglas Co.	($1/$1,000 TCV)	.62	1.34	1.78	1.26	1.60		
Jackson Co.	"	.44	.91	1.21	.81	1.03		
Josephine Co.	"	.85	1.69	2.24	1.59	2.01		
Klamath Co.	"	.11	.23	.30	.22	.27		

/ Millions of board feet scribner
/ Direct employment calculated by multiplying harvest by logging plus sawmill and planning mill or by logging plus veneer and plywood employees per MM bd. ft. provided by Wall 1977 and adjusted for amount processed by type of mill
/ Employment distribution based on log flows
/ Employment multiplier taken from DYRAM June 12, 1978 based on 1974 data
/ State employment multiplier taken from USDI, BLM 1978b
/ Refer to Appendix I for calculation procedure
/ Income multiplier taken from DYRAM June 12, 1978 based on 1974 data
/ (Estimated stumpage price per thousand bd. ft. X harvest X % of receipts going to particular area) 1980 stumpage price = $154 1990 Stumpage Price = $204

County, and less than 1 MM bd. ft. in Douglas and Klamath Counties. These differences amount to about 1 percent of the 1968 to 1978 estimated average annual timber harvest in the Medford Timbershed (Table 2-17).

3.14.1.1 Employment

Although less timber would be harvested with the proposal than with continued current management, local employment would be relatively unchanged. Estimated local employment in logging, sawmills, veneer and plywood would be less (by about 40 full-time equivalent employees) while forest development employment would be more (by about 50 jobs). Nonlocal (pulp and paper) employment would be about the same as that expected under current management.

The distribution of direct employment impacts among Douglas, Jackson, Josephine, and Klamath Counties is based on observed log flows (Table 2-19) and employees per million board feet timber harvest by county (Table 2-18). Direct employment differences in logging, sawmills and planing mills, and veneer and plywood would not significantly affect recent rates of unemployment in Douglas, Josephine or Klamath Counties. Forest development employment would cause projected employment in Jackson County to be insignificantly higher under the proposed timber harvest than it would under continuation of current timber management policies. However, both the continuation of current management policies and the proposed timber harvest policies would result in a decline in lumber and wood products employment from the 1974-76 average level due to other factors such as the projected increase in labor productivity.

Indirect employment impacts would also occur. Total (direct plus indirect) local employment impacts from the continuation of current management would be approximately the same as the proposed management's short-term impacts (1,570 in 1980 compared to 1,560 as shown in Table 3-14).

Data regarding the relationship between total employment and employment in lumber and wood products for Oregon, Douglas County, Jackson County and Josephine County reveal that as wood products employment increases, total employment sharply increases; however, when wood products employment declines, total employment declines by much smaller proportions (USDI, BLM 1978a). This difference may reflect a tendency for unemployed workers to move into alternative employment such as the forest development positions that would be created by the proposal.

3.14.1.2 Community Personal Income Impacts

Local direct employment income from the proposed timber harvest would be lower than would be expected under continued current management. At the same time timber processors may not be able to replace the 8 MM bd. ft. difference between timber harvests with timber from other sources. Thus, total local direct employment and proprietor's income within the lumber and wood products

industry would be about $.2 million less from the proposed timber harvest than from continued average annual harvest from current management. Indirect local income effects from the proposal would amount to $22.8 million, an average of about $.1 million less than from continued current management. These income impacts displayed in Table 3-14 are broken down by area of distribution according to log flows. Less income for entrepreneurs may cause other firms, i.e. local businesses which provide goods and services in support of lumber and wood products industry, to experience minor declines in business potential.

Since the proposal would have only minimal effects on livestock grazing (Section 3.12) and the cumulative impacts on recreation visitation would be insignificant (Section 3.7), the personal income to the local communities from management of these resources would be essentially the same under current management or the proposal. The proposal's influence on personal income derived from commercial fishery is unpredictable.

3.14.1.3 Public Revenue Impacts

For each $100 reduction in receipts from harvest of O&C timber, the county governments of Coos, Curry, Douglas, Jackson, Josephine and Klamath would lose $2.95, $1.83, $12.53, $7.84, $6.04 and $1.17 respectively. The remaining O&C counties would lose a combined total of $17.64 for each $100 reduction.

Total O&C payments under the proposed timber harvest would be approximately $700,000 less than the expected O&C payments under continued current management (Table 3-14). Property tax rate increases adopted to compensate for the difference in potential receipts for all O&C counties combined would amount to $.02 per $1,000 assessed valuation. For Douglas, Jackson, Josephine and Klamath Counties, the average annual property tax increase to restore the difference in potential local public revenue would need to be $.08, $.10, $.10, and $.01 per $1,000 assessed value respectively.

3.14.1.4 Conclusion

In summary, the proposal's short-term employment, income, population, and public revenue impacts would have insignificant differences from impacts of continued current management. The year-to-year changes that result from the variability in timber harvest would exceed the impacts of the proposal.

3.14.2 Long-Term Timber Harvest Impacts

After the first decade of the proposal's implementation, timber harvest would decline from 120 MM bd. ft. to 115 MM bd. ft. The long-term proposed timber harvest (115 MM bd. ft.) would be 17 MM bd. ft. less than the 1974-76 average annual harvest (132 MM bd. ft.) and 13 MM bd. ft. less than the current management's long-term average annual harvest during the next six decades (128 MM bd. ft.). However, it is projected that by the seventh

decade, annual timber harvest from public lands within the JKSYUs under continued current management would decline to 122 MM bd. ft. (7 MM bd. ft. more than the proposed harvest).

The current variability in timber harvest (presumably due to market factors) far exceeds the proposed reduction in average annual timber harvest (from 120 MM bd. ft. to 115 MM bd. ft.) that would occur at the end of the proposal's first decade. For comparison, Table 3-14 displays long-term economic impacts of both current management and the proposal; however this long-term analysis does not consider impacts that would occur beyond the sixth decade.

3.14.2.1 Employment

After the first decade, the proposed timber harvest would cause annual direct local employment (approximately 730 jobs) to be less than the long-term annual employment with current management (approximately 760 jobs).

Both the proposal's and current management's long-term employment projections are less than either the 1974-76 or the short-term average because of expected increased labor productivity and a decline in total timber harvest from other sources.

Long-term total (direct plus indirect) employment would follow the same patterns as long-term direct employment (Table 3-14). The decline in average annual timber harvest employment immediately following the first decade of the proposal would cause a corresponding decline in average annual total employment. This would contribute to the already high employment instability within the lumber and wood products industry. If sufficient alternative local employment is unavailable, the displaced worker would face underemployment, unemployment, and/or emigration.

The prescribed change in timber harvest at the end of the first decade would cause a permanent average annual decrease in lumber and wood products employment which would probably not exceed employment impacts of traditional year-to-year industry related variable timber harvests.

3.14.2.2 Income Impacts

Long-term projected income impacts are shown in Table 3-14. Employment related income impacts would follow timber employment patterns, while entrepreneurial income impacts would correspond directly to timber harvest.

Average annual total direct income generated by JKSYUs timber harvest (employment-related and entrepreneurial) would be lower (by approximately $300,000) under the proposal than with continuation of current management during the first decade (short term). After the first decade, estimated average annual total income generated by current harvest would exceed total income generated by the proposed action by $.7 million (Table 3-14).

3.14.2.3 Population Impacts

Based on a "worst case" assessment, the proposed timber harvest would cause about 175 people to emigrate from Douglas, Jackson, Josephine and Klamath Counties. This assumes that, directly and indirectly, 70 more people would become permanently unemployed under the proposal than under continuation of current management. The number losing employent is multiplied by 2.5 (the worker, plus 1.5 dependents) to determine the total population effect. These population effects are expected to be insignificant compared to the possible population impacts of the projected decline in timber employment due to diminishing timber supplies and decreased labor requirements for timber harvesting and processing.

3.14.2.4 Public Revenue Impacts

Public revenues from O&C payments have been unstable due to shifts in market conditions. Factors contributing to this instability include stumpage price and quantity harvested. The proposed initial harvest level would be 8 MM bd. ft. less than projected timber sales from continued current management. In addition, the subsequent 5 MM bd. ft. decline following the first decade would cause timber receipts to be less than those of current management. This 5 MM bd. ft. decline in annual timber harvest between the first and second decade would cause annual O&C payments to be about $500,000 less if all other variables (e.g. stumpage price) were constant. By 1990, public revenues to the O&C counties would be an annual average of $1.4 million less per year from the proposed harvest than from continued current management (Table 3-14). These respective average annual payments would be $11.7 million compared to $13.1 million. In order for the O&C counties to replace this revenue, the average increase in real estate taxes per $1,000 True Cash Value (TCV) would have to be about $.04 (refer to Table 3-14).

3.14.3 Forest Development Impacts: Short and Long Term

The proposed forest development treatments and manpower requirements for slash disposal, site preparation, planting, gopher control, herbicide release, fertilization and precommercial thinning combined would be equivalent to an estimated 50 full time employees. Since most of these jobs are seasonal, substantially more workers would be employed for shorter periods of time.

3.14.4 Cumulative Effects of Proposed Timber Harvest in Jackson, Klamath and Josephine Sustained Yield Units

In 1978, the Bureau of Land Management prepared an environmental statement assessing the impacts of a proposed timber harvest from the Josephine Sustained Yield Unit (USDI, BLM 1978a). Since most of the Josephine SYU is in the same timbershed as the Jackson and Klamath SYUs (Beuter 1976) and adjacent

to the Jackson SYU, this section analyzes the cumulative effects of the proposed timber harvests in all three units combined. Table 3-15 summarizes both the short-term and the long-term effects by county.

3.14.4.1 Short-term Effects

During the first decade of the proposed timber management plans, 223 MM bd. ft. would be harvested annually. Alternatively, continuation of current management practices would yield an average annual harvest of approximately 274 MM bd. ft. from the three units.

The 51 MM bd. ft. average annual difference in timber harvests would result in a corresponding difference of approximately 260 direct local jobs and 30 non-local jobs. Annual total local employment (direct plus indirect) would be nearly 370 less if the proposed harvests were adopted. The differences in direct employment would amount to about 7 percent of the total employment projected to be supported by logging and primary timber processing within the Medford Timbershed.

Locally, average annual direct income would be $22.1 million compared to an expected income of $26.8 million under current management. This would be about 21 percent less. The difference in total income (direct plus indirect) resulting from the different harvest levels would be approximately $8.3 million.

Average annual public revenues to O&C counties would be an expected $21.1 million from continued current management and $17.2 million from the proposal. This would be an annual difference of about 23 percent. The tax rate equivalence of revenues to compensate for the difference in O&C payments would vary from county to county. However, the average for the O&C counties would be $.11 per $1,000 true cash value.

The proposed timber harvests would have subtle effects on local populations. These impacts would be directly related to employment and would occur primarily in Josephine County with less significant effects in Douglas and Jackson Counties. Population impacts would occur sometime after the employment impacts occur. A "worst case" assessment would assume that all of the 260 individuals who would lose direct local employment would be unable to find alternative local employment. If all of these people migrated out of the area in search of alternative employment, the local population would eventually decline by approximately 650 people (260 X 2.5 workers and dependent population).

3.14.4.2 Long-Term Effects

The combined average timber harvests from the Josephine, Jackson, and Klamath SYUs would be higher under a continuation of current management (274 MM bd. ft.) than under the proposed management (211 MM bd. ft.), during the first six decades. After the ninth decade the combined harvest from continued current

Table 3-15

Cumulative Annual Economic Effects of Current and Proposed Timber Management in the Josephine, Jackson, and Klamath Sustained Yield Units

	Units	Current Management Projected Short-Term (1980)	Current Management Projected Long-Term (1990)	Proposed Management Projected Short-Term (1980)	Proposed Management Projected Long-Term (1990)	Comparison of Proposed to Current Management Short Term % Difference	Comparison of Proposed to Current Management Long Term % Difference
Average Annual Timber Harvest 1/							
BLM Timber Jackson Josephine SYUs Klamath	MM bd. ft.	274	274	223	211	- 23	- 30
All Sources (Medford Timbershed)	MM bd. ft.	609	599	570	550	- 07	- 09
Employment (Direct)							
Local Total		1,750	1,540	1,490	1,270	- 15	- 21
Timber	jobs	1,740	1,530	1,400	1,180	- 20	- 30
Douglas Co. .23 2/	"	410	370	330	280		
Jackson Co. .40 2/	"	770	670	620	520		
Josephine Co. .36 2/	"	540	480	440	370		
Klamath Co. .01 2/	"	20	10	10	10		
Forest Development (Jackson)	"	0	0	50	50		
(Josephine)	"	10	10	40	40		
Non-local	"	170	160	140	120	- 24	- 30
Employment (Direct & Indirect) including Forest Development							
Douglas Co. EM = 1.562 3/	jobs	630	570	520	440		
Jackson Co. EM = 1.844 3/	"	1,410	1,240	1,240	1,040		
Josephine Co. EM = 2.000 3/	"	1,080	960	1,000	820		
Klamath Co. EM = 1.642 3/	"	30	20	20	20		
Total Local	"	3,150	2,790	2,780	2,320	- 13	- 20
Total Nonlocal EM = 1.82 3/	"	320	280	260	220	- 23	- 27
Total Direct & Indirect - 14 - 21	"	3,470	3,070	3,040	2,540		
Income (Direct) including Forest Development 3/							
Douglas Co. 4/	($1,000,000)	6.6	6.5	5.4	5.0		
Jackson Co. 4/	"	11.7	10.7	10.3	9.1		
Josephine Co. 4/	"	8.2	7.4	6.2	6.3		
Klamath Co. 4/	"	0.3	0.2	0.2	0.2		
Total Local		26.8	24.8	22.1	20.6	- 21	- 20
Income (Direct & Indirect)							
Douglas Co. I.M. = 1.53 5/	($1,000,000)	10.2	9.9	8.3	7.6		
Jackson Co. I.M. = 1.74 5/	"	20.4	18.7	17.9	15.8		
Josephine Co. I.M. = 1.91 5/	"	15.6	14.1	11.8	12.1		
Klamath Co. I.M. = 1.58 5/	"	0.4	0.4	0.3	0.3		
Total Local	"	46.6	43.1	38.3	35.8	- 22	- 20
Public Finance							
Dependent O&C Payments	($1,000,000)						
O&C Counties .50 6/	"	21.1	26.9	17.2	21.5	- 23	- 25
SW Oregon Counties .31 6/	"	13.2	16.8	10.6	13.3	- 25	- 26
Jackson Co. .08 6/	"	3.3	4.2	2.7	3.2		
Josephine Co. .06 6/	"	2.5	3.4	2.1	2.6		
Tax Rate Equivalence of O&C Payments 7/							
O&C Area	($/$1,000 TCV)	.60	.76	.49	.61	- 22	- 25
Douglas Co.	"	2.88	3.67	2.34	2.94		
Jackson Co.	"	1.95	2.48	1.51	1.90		
Josephine Co.	"	3.63	4.63	2.95	3.70		
Klamath Co.	"	.49	.63	.40	.50		

1/ Millions of board feet Scribner
2/ Employment distribution based on combined log flows
3/ Employment Multiplier
4/ Refer to Appendix I for calculation procedure
5/ Income multiplier
6/ Percentage distribution of O&C receipts
7/ Refer to Appendix I for calculation procedure

management (209 MM bd. ft.) is expected to be less than under the proposed management (211 MM bd.ft.). This analysis compares the cumulative long=term effects of timber harvest for the first six decades only.

Based on the projected 1990 labor productivity in lumber and the wood products industry (Table 2-16), continued average current harvest levels would result in the local direct employment of approximately 270 more people than would be employed under the proposed annual harvest levels. Total local (direct plus indirect) employment would be about 470 higher under a continuation of current average harvest levels. Total local employment generated by the timber harvests would be 20 percent less under the proposal than under continuation of current management. A comparative breakdown by county is available in Table 3-15.

Generally long-term income impacts would correspond to employment impacts and timber harvest trends. By 1990, total local direct income from continued current management is projected to be approximately $24.8 million compared to $20.6 million from the proposed management and total (direct plus indirect) local income from continued current management would be an estimated $7.3 million higher than from the proposed harvests.

By 1990, average annual public revenue generated by the three SYUs would be approximately $26.9 million and $21.5 million from continuation of current management and the proposal respectively. The proposal would represent a 25 percent decline from revenues expected under current management. The equivalent tax rate necessary to compensate for the difference in revenues would vary from county to county, but would average $.15 per $1,000 true cash value among the O&C counties, Table 3-15.

The differences between the projected cumulative short term and long-term impacts are caused in part by an expected decline in labor intensive practices and an expected increase in stumpage prices.

3.14.4.3 Conclusion

In summary, relatively insignificant short-term and long-term changes in timber harvest would occur in the Jackson and Klamath SYUs while substantial changes would occur in the Josephine SYU. Consequently, the environmental statement on the Josephine Sustained Yield Unit Ten-Year Timber Management Plan (USDI, BLM 1978a) analyzes most of the specific economic impacts. Implementing the proposed harvest in all three units would intensify the impacts in each county.

3.15 IMPACTS ON SOCIAL CONDITIONS

This analysis projects social impacts expected from implementing the proposed action. Social values and attitudes are assumed to be affected in the following ways:

-- A person's attitudes are strongly influenced by material interests: those things felt to be important such as economic income and physical possessions, especially houses and land. Activities which are believed to threaten these interests are likely to be opposed.

-- Organized groups provide their members with information and shared definitions of the situation which are influenced by and reinforce existing values and attitudes of the members.

-- Attitudes which are not supported by a personal stake in material interests or by membership in organizations will be most easily influenced by mass media reporting.

Using this framework, it is expected that many people have strong and immediate personal reactions to BLM actions that affect their job situation, business or property values. Other individuals form opinions on the basis of formal positions taken by groups and organizations to which they belong such as Southern Oregon Timber Industries or the Sierra Club. Finally, some people have very little opinion about agency actions, e.g., herbicide use, road closures or harvest practices, until such actions become controversial or affect them personally.

3.15.1 General Impacts

The population most directly affected by the proposed action would be those who lose or gain employment. The workers who would lose their timber related jobs and those who would fill the forest development jobs are not necessarily interchangeable. Forest development jobs such as planting, thinning and cone collecting have been adopted by larger private forest products companies and, to a lesser degree, government agencies. The general image of this type of work, however, is that it is low paying, dangerous in some cases, and seasonal. A planter generally makes between $25 and $50 per day before expenses while a thinner makes $25 to $75 before expenses. Those employed in traditional high-risk logging jobs on the other hand, such as timber fallers, make between $125 to $175 a day. Because of these factors, most of the forest development work is done by young, single people, and it is generally done for only a limited amount of time. Under conditions of extreme hardship, people involved in the more traditional fields of logging and mill work might take such jobs, but they would not do so without a certain amount of resentment and a feeling that they were doing so in desperation. It is to be expected that certain groups (young, inexperienced, possibly countercultural) would experience a higher level of employment than other groups (traditional timber industry workers, described by Stevens 1976). Even a small change in the employment structure may intensify already existing conflict between individuals in each group.

Social impacts would be somewhat site specific. A number of variables would affect the social impact of a given action. These include visibility of the action, communication with impacted population, negotiation, explanation,

receptiveness by BLM personnel to local concern, and adaptability of the impacted population.

3.15.2 Impacts of Proposed Action on Specific Values

People whose first priority is esthetics would probably favor planting and oppose road building and clearcutting. Although specific impacts would depend on the location of the action, salvage cutting and forest regeneration efforts would probably be accepted.

Herbicide application is likely to result in significant organized opposition, especially if such application is on land near residential areas or water supplies. This would result in intensification of the value conflicts between groups and may lead to organized protest, legal action and/or violence. Rural residential development may be slowed, relocated or avoided because of its proximity to areas of herbicide application or degraded viewsheds. These reactions would tend to complicate or disrupt the local lifestyles. The area may become less appealing if it is perceived to have lost its esthetic appeal and simplicity of life. Even if these are just perceptions, e.g., if residents think herbicide applications have harmful health effects even if they actually don't, the quality of life in the area would be degraded because of residents' sense of helplessness in controlling their environment and their own lives.

Most persons who relate to the forests in terms of the recreational opportunities would favor additional roads and access to recreational areas. Providing such access would reinforce the recreational value associated with the forests. However, wilderness advocates and some hunters would view additional roads as a potential threat to natural habitats. Those who value the forest's beauty, clean air and water would oppose herbicide applications and other forest management practices that would affect the esthetic values of the land, e.g., scarification or clearcutting.

3.15.3 Conclusions

The proposal may increase the underlying conflict between people with personal economic interests and those with health, esthetic or recreational interests. The impacts of specific treatments on personal and/or community values would depend in part on the locations of treatment application, the manner in which BLM communicates and negotiates its actions with affected residents, and the adaptibility of those who are affected.

3.16 IMPACTS ON HUMAN HEALTH

This discussion of impacts of proposed herbicide use on human health comes mainly from the final environmental statement on Vegetation Management with Herbicides--Western Oregon (USDI, BLM 1978d) describing herbicide use for Oregon.

The possibility of human health being impacted by the proposed use of herbicides on 29,690 acres is related to the likelihood of exposure and the toxicity of the chemicals proposed for use (Norris 1978).

In general, exposure of humans to herbicides can occur in two ways: directly, as in the case of applicators or outdoor enthusiasts; or indirectly. The number of persons that could be directly affected by herbicide application in the planning area is very small. Exposure from contact with contaminated streams is more likely to occur than is direct exposure. The two most likely sources of stream contamination are direct application to surface waters and drift from nearby spray areas. Project design features (Section 1.3.4.2) would minimize both of these contamination sources and reduce risk of exposure. Particular care would be taken to avoid exposure of the six residences within 1 mile of spray areas proposed in the 1-year herbicide plan (Appendix B).

The chance that humans exposed to herbicides used in timber management would be adversely impacted is also related to the toxicity of the herbicides. The chemicals (other than 2,4-D) proposed for use are slightly toxic, practically nontoxic or relatively harmless to humans. (See Table 3-16.) Therefore, it is expected that exposure under most circumstances would not result in injury to human beings. Since neither 2,4,5-T nor silvex would be used, and because 2,4-D does not contain TCDD (and cannot alter to form TCDD because of its structure), there would be no TCDD introduced into the environment. Since the likelihood of exposure, both direct and indirect, is small and the chemicals proposed are nontoxic or slightly toxic, the impacts of herbicides other than 2,4-D on human health are minimal.

The low-volatile ester of 2,4-D used in timber management is moderately toxic to humans (Table 3-16). Some laboratory tests, not substantiated under field conditions where application levels are lower than in lab tests, indicate that it has potential for chronic effects such as teratogenicity (fetal deformation) (Courtney 1975), fetotoxicity to birds (see Section 3.6.2.4), and carcinogenicity (Hansen et al. 1971). Careful planning of treatment areas and handling of 2,4-D will minimize the chance of exposure. In the worst case, the potential may exist for adverse impacts to human health.

Until more studies are conducted, the exact nature and extent of the impacts of herbicide spraying cannot be determined.

3.17 IMPACTS ON ENERGY USE

Due to the types of equipment employed and the level of treatments included, the proposed action would be considered energy intensive. Table 3-17 indicates the energy investment required, as expressed in British thermal units (Btu's). Energy required for processing of logs into lumber, plywood, etc., is not included since manufacturing costs vary widely depending on mill efficiency. The secondary energy investment for milling is 62,000 Btu's per dollar of manufacturing cost.

Table 3-16

Toxicity Classes (Various Routes of Administration) and Relative Toxicity of Proposed Herbicides to Humans

Toxicity Rating	Commonly Used Term	LD_{50} Single Oral Dose Rats	Inhalation 4 hr. Vapor Exposure Mortality 2/6-4/6 Rats	LD_{50} Skin Rabbits	Probable Lethal Dose for Humans
1	Extremely toxic	1 mg or less/kg	< 10 ppm	5 mg or less/kg	A taste, 1 grain
2	Highly toxic	1-50 mg	10-100	5-43 mg	1 teaspoon 4cc
3	Moderately toxic	50-500 mg	100-1,000	44-340 mg	1 ounce 30 gm
4	Slightly toxic	0.5-5 g	1,000-10,000	0.35-281 g/kg	1 pint 250 gm
5	Practically non-toxic	5-15 g	10,000-100,000	2.82-22.59 g/kg	1 quart
6	Relatively harmless	15 g and more	>100,000	22.6 or more g/kg	> 1 quart

Herbicide	Acute Oral LD_{50} in Mg/Kg	Relative Toxicity Rating for Humans 1/
2,4,-D	375-666	3-4
Roundup	4,900	4
Krenite	24,000	6
Atrazine	1,750-3,080	4
Dalapon	9,000	5
Table salt (included for comparison)	100-300	3
Aspirin	750	4

1/ Based on the LD_{50}-single oral dose rats.

Source: Oregon State University, Extension Service 1979.

Table 3-17

Estimated Annual Energy Consumption Attributable to the Proposal

Treatment	Units		Estimated Cost per Unit ($)	Assumed Energy Requirement per $ of Cost (1,000 Btu's)	Energy Consumption (1,000,000 Btu's)
ROADS					
New Construction	37.5	miles	$23,000	80	69,000
Reconstruction	10	miles	10,000	60	6,000
Surfacing	5	miles	10,000	50	2,500
Maintenance	400	miles	500	54	10,800
LOG PRODUCTION (all actions taken to cut trees and get logs to the mill)	120,000	M bd.ft.	200	55	1,320,000
SLASH DISPOSAL					
Burning	2,370	acres	27	31	1,984
Gross Yarding	3,300	acres	56	31	5,729
HERBICIDE					
Site Preparation	1,754	acres	25	122	5,350
Release	1,215	acres	25	122	3,706
MECHANICAL SCARIFICATION	2,230	acres	100	100	22,300
PLANTING	5,745	acres	125	31	22,262
THINNING					
Precommercial	796	acres	50	31	1,234
Commercial	1,522.5	acres	(included with Log Production)		
FERTILIZATION	2,318.5	acres	75	122	21,214
GOPHER CONTROL	900	acres	35	31	977
TOTAL					1,492,996

NOTE: BLM estimated costs per units were often a range of values. The listed costs were selected as indicative of the JKSYUs situation. Similarly, DOE energy requirements were also given as a range in some cases.

Sources: BLM data except for Assumed Energy Requirements per Dollar of Cost, which was derived from data furnished by Frank Brown, U.S. Department of Energy, Region X.

The annual energy consumption attributable to the proposed action would be 1.493 trillion Btu's. Of this, 1.408 trillion Btu's, or 94 percent of the total, is attributable to road development and care (construction, reconstruction, surfacing and maintenance) and log production. Such operations involve heavy equipment and machinery, the energy efficiency of which is dictated by available technology. About 6 percent of the total consumption, approximately 90 billion Btu's, is due to other management practices of the proposal. The actions involved are for the purpose of optimizing the sustainable timber production level.

If the 1.493 trillion Btu's identified in Table 3-17 were all expended in the form of gasoline, it would equate to 11.9 million gallons which amounts to 0.9 percent of the 1.362 billion gallons of gasoline consumed in Oregon during 1977.

CHAPTER 4

Mitigating Measures Not Included In The Proposed Action

4

4. MITIGATING MEASURES NOT INCLUDED IN THE PROPOSED ACTION

The measures analyzed in this Chapter are actions that would reduce or eliminate adverse impacts of the proposed action as identified in Chapter 3. These mitigation measurea are taken in addition to those included in project design features of the proposal (Section 1.3). Each measure is described and impact reduction quantified to the extent possible. All measures are considered feasible with existing technology and would be required if the proposed action is implemented.

4.1 FORAGE LOGS

Down cull trees will be left in areas scheduled to receive gross yarding. A minimum of three 24-inch diameter trees per acre will be left when available.

4.1.1 Animals

The measure will assure that forage logs beneficial to wildlife will be left on 33,000 acres scheduled to receive gross yarding.

4.2 DISTRIBUTE BLM SPRAY SCHEDULE FOR PROPOSED TREATMENTS WITHIN 500 FEET OF THE PACIFIC CREST TRAIL

A schedule of spraying by the BLM within 500 feet of the Pacific Crest Trail will be provided to U.S. Forest Service (USFS) District Offices adjoining the project areas. The schedule will be provided so that there will be adequate time to assure that each USFS District′s weekly recreation report includes this information at least 1 month prior to the proposed spraying. Each treatment area within the 500-foot zone will be identified. The herbicide(s) used and a short description of the persistency and toxicity will be included.

4.2.1 Social Conditions

This measure will serve to mitigate some of the value conflicts identified in Section 3.15.2.

4.2.2 Human Health

Section 3.16 concluded that the potential for significant adverse effects as a result of spraying with 2,4-D may exist in a worst case situation. By identifying units along the Pacific Crest Trail which are proposed for herbicide treatment, long-distance hikers can plan trips accordingly so as to not encounter recently sprayed areas, if they so choose.

5

CHAPTER 5

Adverse Impacts Which Cannot be Avoided

5

5. ADVERSE IMPACTS WHICH CANNOT BE AVOIDED

Chapter 5 presents the unavoidable significant adverse impacts that would result from implementation of the proposed action. Design features discussed in Section 1.3 constitute best management practices employed for each treatment. Design features are specifically selected from a wide variety available to meet the situation on each individual treatment area.

The proposed action constitutes a reduction in volume of 8 million board feet (MM bd. ft.) per year to be harvested; therefore, less area is subject to logging treatments. Forest development practices, however, are increased over present levels.

5.1 AIR QUALITY

Slash burning would have significant adverse affects on air quality since particulate concentration could be increased up to 55 percent over present levels, and visibility would be decreased within a 12-mile radius of the burn. Impacts would be minimized by the Oregon State Department of Forestry's Smoke Management Plan, which restricts burning during unfavorable conditions. Should project design features and the Smoke Management Plan fail, however, smoke could move into the Bear Creek Valley and cause violations of the air quality standards.

5.2 SOILS

Construction of new permanent roads in the JKSYUs would cause an additional 53,100 tons of soil to erode. In addition, road maintenance, yarding and slash disposal would cause erosion of 11,000 tons of soil over the decade. If this loss were topsoil from low fertility and/or shallow sites, it would impact the soil resource adversely, but impacts would have site-specific (and not widespread) significance in the planning area. Soil compaction would result in about a 15 percent reduction of timber growth on 9,700 acres.

5.3 WATER RESOURCES

As a result of the proposed action, water yield would increase 4,500 acre-feet per year (see Section 3.4.1 for methodology); this additional water (the result of disturbance) would be less than in the past 5 years. Streams next to treatment areas would experince increased streamflow and more streambank erosion as a result of this increased flow.

Increased sediment yield from the JKSYUs would be 15,650 tons as a result of yarding, road construction, slash disposal and mechanical scarification. The sediment added from the proposed action would not have significant impacts on overall water quality, but significant adverse impacts in localized areas,

particularly on small streams, could occur. This includes alteration of aquatic habitat (with subsequent loss of fisheries value possible), and/or recreation. Water quality could be degraded somewhat by nutrient enrichment as a result of harvest, yarding and slash burning. This is not expected to affect the whole of the planning area but could have significant adverse impacts on some areas immediately downstream of construction activities.

Slash burning could increase stream temperatures and sediment yield significantly if streamside vegetation is accidentally burned.

5.4 VEGETATION

Approximately 30,000 acres or 31 percent of the old-growth (200+ years) forest community would be removed from commercial forest land in the JKSYUs during the proposal period. Early successional communities would increase an estimated 184 percent. This impact represents a significant depletion of old-growth habitat as well as a significant increase in early stage habitat. Approximately 1,770 acres would be precluded from vegetation growth due to road construction. This is insignificant for the JKSYUs as a whole.

Following harvest, artificial reforestation with various commercial coniferous species is proposed. Subsequent development practices designed to favor commercial coniferous species would reduce or inhibit species normally found in association with early successional stage conifers. This represents significant changes to existing community structure.

Timber management, therefore, could be viewed as an unavoidable adverse impact to vegetation because timber harvest alters the composition of the pre-disturbance forest community, and forest development practices alter the composition of the plant communities which naturally occur following forest disturbance. Development practices ultimately shorten the time required for the forest community to reestablish itself. The reestablished forest would be harvested before it could attain the community structure of the pre-logging old-growth community. If the proposed level of harvest were continued, all the old growth on the high intensity lands (except that amount indicated on Table 1-8) would be harvested within five decades. This impact is highly significant.

5.5 ANIMALS

The proposed action would modify animal habitat conditions on approximately 25,781 acres during the first 3 years and on about 90,000 during the decade. This would be the result of all harvest and thinning actions. Of the 10 year total, about 30,000 acres would be old growth (200+ years) forest. This is about 31 percent of the old growth currently present. No information is available on the amount of old growth proposed for harvest during the first 3 years.

Approximately 68,000 acres of old growth would remain on the high intensity lands at the end of the first decade. This would be eliminated by the end of the fifth decade except for an estimated 7,500 acres set aside in stream buffer strips, spotted owl management areas and other sites.

This reduction in old-growth habitat would probably mean a corresponding reduction in numbers of those species dependent on old growth such as northern spotted owl, northern flying squirrel and pileated woodpecker.

Gross yarding and burning would adversely affect the ground dwelling species in the areas so treated for a short period of time.

Proposed developmental practices would keep much of the area in a Douglas-fir vegetation type and other species, many of which are valuable as cover or forage, would not be allowed to become established. This would adversely affect those species dependent on early successional stage vegetation. Chemical control of competing vegetation would be applied to about 29,500 acres of the JKSYUs during the first decade.

New roads would occupy 440 acres during the first 3 years and total 1,770 acres during the decade. These acres would be unavailable for production of wildlife cover or forage.

Snag removal, performed for safety reasons, would eliminate critical habitat for a variety of animal species. The removal of dying trees for insect or disease control precludes the development of new snags to replace those trees which decay and fall. This represents a significant impact on dependent wildlife species. This would be partially mitigated by snags left in riparian leave strips and by Management Framework Plan recommendations to leave some snags standing if they do not present a safety hazard.

The reduction of pocket gophers on the 9,000 acres scheduled for treatment with poison bait would be an adverse impact that would not be mitigated.

Fishes would be adversely impacted by stream bottom sedimentation and seasonal increase of suspended sediments due to yarding, road construction and scarification. Worst case analysis discloses over 15,650 tons of sediment (Section 3.4.2.1) could be added to streams during the decade. Because the most sediment is added during periods of peak stream flow, deposition impact would be reduced by flushing. Nonetheless, the impact could be significant on fish habitat. During the first 3 years, Sales 80-12, 81-3, 81-17, 81-19 and 82-20 have the potential to damage important fishery waters due to increasing sediment loading.

Herbicide application would introduce undetermined concentrations of toxic chemicals in the aquatic environment. It is doubtful, although possible, that levels of toxic chemicals so introduced could exceed lethal levels for aquatic organisms.

Individual northern spotted owls would be adversely impacted, although the species as a whole would only be moderately affected. Individual Siskiyou

Mountain salamanders would probably be impacted if they occurred in areas that are harvested. It is not likely the species as a whole would be harmed.

No impacts to any Federally-listed threatened or endangered species are anticipated.

5.6 RECREATION

Recreation activities oriented toward appreciation of natural beauty and solitude would be unavoidably impacted by timber management actions, at least temporarily, in any specific location subject to such actions. The recreation experience would be degraded near some recreation sites. Some recreation management opportunities for sightseeing, hiking and backcountry experiences would be unadvoidably impacted. Reservoirs and other recreational water bodies would be subject to localized adverse impacts to recreation quality.

5.7 CULTURAL RESOURCES

Some historical and archeological values would be unavoidably impacted since it is impossible to locate all such sites in the dense vegetation of the JKSYUs. Level of significance would depend on the scientific value of each site.

5.8 VISUAL RESOURCES

Change would occur in the present landscape. All timber management treatments introduce contrasts from the existing visual mosaic some of which result in unavoidable short-term adverse impacts. Silvicultural practices, road construction and vehicle operation associated with yarding, blasting and excavation would create long-term landscape alterations. Smoke from slash burning would create a seasonal impact on visibility.

5.9 WILDERNESS

Any unwithdrawn lands with wilderness characteristics would be severely impacted since wilderness values would be lost.

5.10 NOISE

Noise associated with proposed actions would create adverse impacts to those who are in the forest seeking solitude.

5.11 SOCIOECONOMIC CONDITIONS

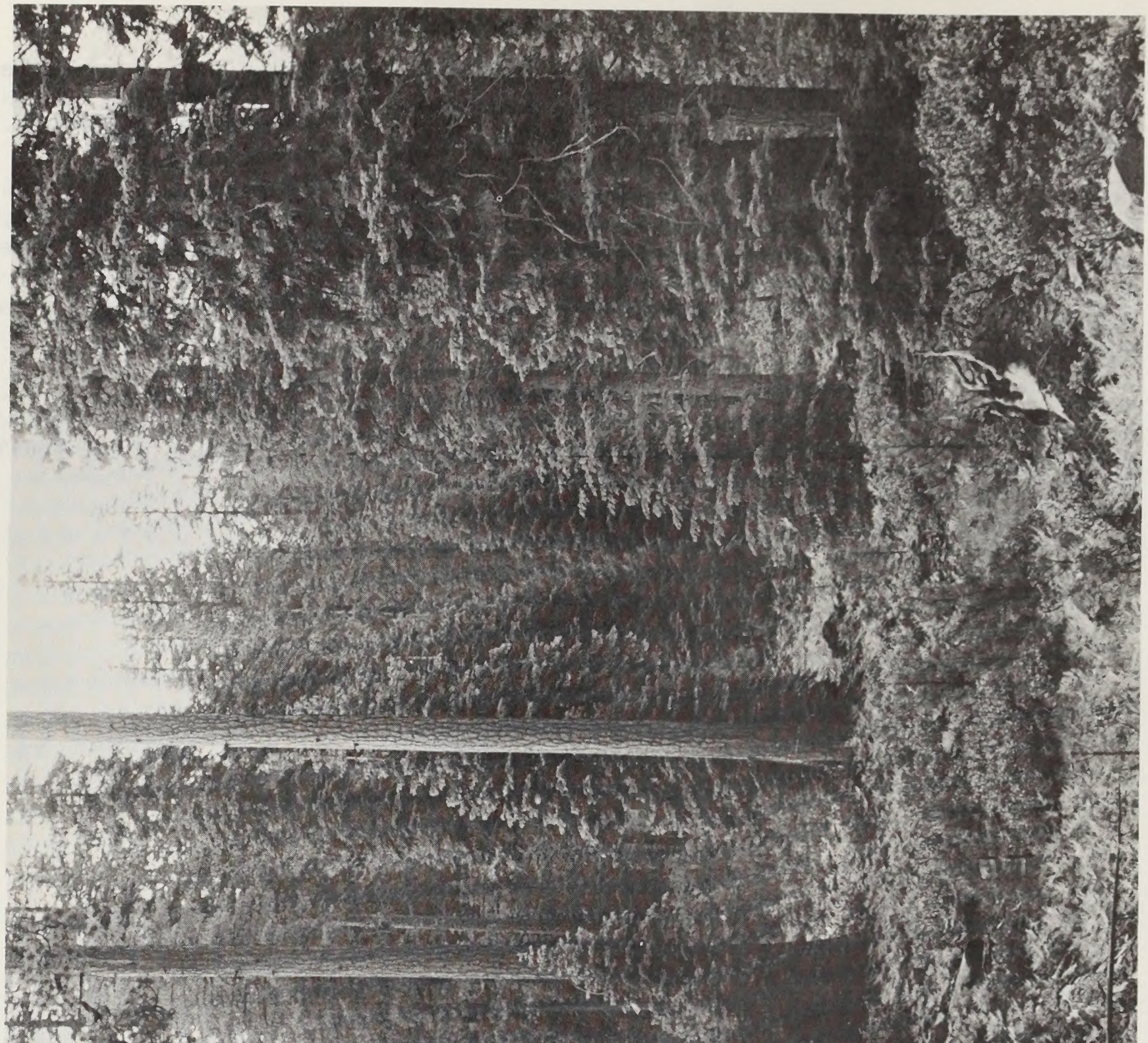
Compared to continued current management, implementation of the proposed action would result in approximately 10 more local jobs directly related to

timber developments, harvesting and processing. Direct local income would be about $200,000 less than from continued management. The proposal would also result in $700,000 less in public revenue per year to the O&C counties.

Adverse residual socioeconomic impacts would occur primarily as impacts to individuals and households. Traumas of additional employment insecurity and income instability may be a significant impact. Even if actual incidence of employment and income impacts are insignificant relative to recent variations, the perceived initial effects or anxiety from expectation may be more widespread.

5.12 ENERGY USE

Annual energy consumption attributable to the proposed action would be 1.493 trillion Btu's.



CHAPTER 6

The Relationship Between Local Short-Term Uses of Man's Environment and Long-Term Enhancement of Productivity

6

6

6. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This chapter considers impacts on long- and short-term productivity. A long range perspective of the possible effect of the proposed action on overall environmental productivity is provided.

This chapter will also summarize the trade-offs between the short-term uses contained in the proposed action and the long-term resource use and environmental effects of the proposal. The short term discussed is 10 years, the term of the proposed allowable cut plan. The long term is the time after all coniferous trees now standing on the high intensity lands designated for inclusion in the harvest plan would be cut--approximately 60 years and longer.

The short-term use of the high intensity lands for timber harvest would increase the long-term production of wood fibers as old, slow-growing stands are replaced by young, fast-growing stands managed for optimum wood production. In the long term, as the area approaches a balance of age classes, there is potential for increasing the allowable harvest. The trial harvest on low intensity lands may lead to similar results.

In the long term, the harvest of old-growth timber on these lands would encourage the expansion of earlier successional stages of habitat. Some plant and animal species dependent on old-growth community conditions would be reduced in these areas. The habitat changes, on the other hand, would enhance the potential for deer and elk and provide for a greater diversity of small mammals and birds on these areas. The removal of many snags and dead trees in the course of harvesting timber would reduce habitat for cavity users.

A substantial portion of the old-growth stands remaining on public lands has been designated for harvest, however; 94,543 acres, some of which include old-growth timber, have been excluded from timber harvest and would remain essentially unaltered (see Table 1-8). These lands provide a long-term reserve of old-growth wildlife habitat and are likely to be supplemented by exclusions from harvest in other Federal timber management plans and wilderness designations.

Annual slash burning would have at least localized adverse impact on air quality and visibility during burning periods. Slash burning on other lands would sometimes compound this effect, but not cause it to be further dispersed.

Logging activities would inevitably cause some erosion and compaction of soil. The resultant long-term loss in soil productivity as a result of compaction would be minimized by project design features and by such practices as ripping, but those soils not treated to reduce compaction would not recover for 35 to 40 years. Sediment accumulation in streams would have adverse effects on aquatic habitat, which would continue over the long term. Although collective timber harvest activity on all lands in the Rogue and Upper Klamath

River drainages would be at a lower level for many years to come than in the recent decade, combined sediment accumulation in streams from all sources would damage aquatic habitat in some stream reaches.

The use of 1,770 acres for new timber management roads would remove that land from vegetative production and wildlife habitat for the long term.

Intensive timber management practices such as herbicide application would favor survival of coniferous trees and discriminate against hardwood trees, shrubs, and herbaceous vegetation. Application of herbicides and fertilizers would increase wood fiber production in the long term and provide for higher rates of harvest in the short and long term.

Access would be increased for recreation users such as hunters, anglers and berry pickers. A consequent increase in dispersed activity visitor use is expected to occur. The more managed environment would be less attractive to, and is expected to diminish visitation by, recreationists who seek the beauty and solitude of the old-growth forest, with consequent increase in visitation to remaining unmanaged forest areas in the region.

The loss of old-growth timber from these areas would also change an esthetic resource, particularly for direct contact viewers. However, the resultant variation in visual features in the emergent managed forest would have esthetic appeal of a different kind; in some cases visual features would be enhanced for the foreground or background viewer.

The long-term cumulative effect of all the treatments as displayed in Table 1-1 (i.e., the proposed action) is a managed forest which would produce timber on a sustained yield basis. Other values of the present old-growth acreage on high intensity timber management lands would be foregone except on those lands possibly containing old-growth specifically excluded from the treatments.

CHAPTER 7

Irreversible and Irretrievable Commitment of Resources

7

7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

This chapter identifies the extent to which the proposed action would irreversibly limit the potential uses of the land and resources. The term irreversible means incapable of being returned to its original state. Irretrievable means a resource or value cannot be replaced.

Slash burning could significantly lower the air quality of the JKSYUs with respect to particulates emissions. This could have irreversible impacts on other resources.

The amount of soil that would be irretrievably lost due to the proposal could be 64,250 tons over the decade.

An unknown decline in the water quality of some streams would occur due to contamination by sedimentation, debris slides, nutrient losses from soil on logged areas and application of chemicals.

Approximately 31,200 acres of commercial forest would be converted to early successional stage communities. Approximately 30,000 acres of old-growth Douglas-fir community would be irretrievably lost due to logging operations. Some unidentified endangered plant species could be lost, directly through logging, road construction or herbicide application, or indirectly as a result of habitat changes. Permanent road construction would eliminate vegetation from 1,770 acres.

During the first decade 1,770 acres of habitat would be lost to roads. About 440 of these acres would be eliminated during the first 3 years. These acres could be reclaimed and become productive habitat in future years if the road system is no longer necessary.

Cavity nesting species would be irreversibly impacted as snags and potential snags would be reduced on approximately 33,000 acres.

Habitat for old-growth dependent species would be eliminated on about 30,000 acres during the first decade. This acreage would never again support old-growth habitat under proposed management plans.

Currently, there are 23 known pairs of northern spotted owls residing in the JKSYUs. Of these, 14 pairs occupy high intensity forest lands and are not included in the 8 pairs scheduled to receive complete habitat protection. These and other located pairs would receive a minimum of 15 acres of buffer around nesting trees during the nesting season. These acres may be harvested at other times. If remaining habitat is at carrying capacity, then these 14 pairs of owls may be in jeopardy.

An unknown number of Siskiyou Mountain salmanders may have their habitat destroyed if they exist in an area that is harvested.

There would be irretrievable loss of solitude, serenity or isolation due to timber management activities. Some timber management activities would result in the loss of recreational opportunities.

Damage or destruction of any archeological or historic site would be irreversible and irretrievable. Knowledge lost as a result would be permanent. The potential of the undisturbed sites and their settings to provide interpretive, educational, recreational and esthetic opportunities would decrease.

Wilderness values lost as a result of the proposed action would be an irretrievable commitment.

Some land invested in roadways, both existing and proposed, is irreversibly lost to other uses. Restoration techniques applicable in gentle topography are not effective or practical in the steep terrain of some sections in the JKSYUs.

The energy investment of the proposal (1.493 trillion Btu's) constitutes an irretrievable reduction of dwindling world supplies of petroleum-derived energy. The relative magnitude of the reduction is unknown.

Based on operating costs, implementation of the proposal is expected to require approximately $3,500,000 per year. This includes planning, layout and administration of timber sale; planning, contract cost and administration of forest development projects; provision for seedling planting stock; and the tree improvement program.

CHAPTER 8

Alternatives

8

8

8. ALTERNATIVES

Five alternatives to the proposed action will be described and analyzed in this chapter. Each alternative discussed relates to a level of timber harvest since timber production is a major goal for the management of forest lands in the JKSYUs as specified by the O&C Act. Several alternatives include harvest schedules not permissible under present law, regulation or policy. However, they are included to provide the decisionmakers with a variety of choices.

Since all alternatives are for different levels of timber harvest, mitigation measures are the same as those included in the proposal as project design features (Section 1.3). Adverse impacts which cannot be avoided correspond to those identified in Chapter 5 for the proposal, varying only in relation to the harvest level and specific treatments in each alternative.

The five alternatives are:

1. No control of competing vegetation

2. Limited investment in timber production

3. Utilization of surplus inventory

4. Forestry Program for Oregon

5. No action.

These alternatives are not the only alternatives to the proposed action, but represent a cross section of possible options. Land use allocation options were considered in the management framework planning process and are discussed in Section 1.2.5. The 0.86 million cubic feet from trial harvest on low intensity lands is an intact feature of any of the timber harvest alternatives except no action.

Table 8-1 compares estimates of prescribed management treatments involved in the proposal with estimates of treatments for each alternative. Impacts to major resource components for each alternative are analyzed in relation to the existing environment as described in Chapter 2 and summarized in Table 8-4. Table 8-5 compares all the alternatives with the present situation in relation to statewide goals of the Oregon Land Conservation and Development Commission (LCDC).

Analysis of the alternatives indicates that there would be no significant impacts upon climate, geology, mining, agriculture, rural and urban lands, grazing or transportation systems. These topics will not be discussed further in this chapter.

Table 8-1

Proposed Action and Alternatives by Treatment

	Proposal		Alternatives					
	High Intensity Lands	Low Intensity Lands	(1) No Control of Competing Vegetation	(2) Limited Investment	(3a) Utilization of Surplus Inventory (one Decade)	(3b) Utilization of Surplus Inventory (two Decade)	(4) Forestry Program for Oregon	(5) No Action
Annual Harvest in First Decade								
Million cubic feet	19.69	0.86	15.64 1/	18.66 1/	27.53 1/ 2/	23.19 2/	18.84 1/ 2/	21.93 3/
(million board feet Scribner)	(115)	(5)	(91)	(109)	(161)	(136)	(110)	(128)
Ten-year Prescribed Management Treatments (acres)								
Transportation System								
Construct 375 miles of permanent road	1,600	170	1,770	1,770	1,770	1,770	1,770	1,770
Reconstruct 100 miles of existing road	0	0	0	0	0	0	0	0
Surface 50 miles of existing road	0	0	0	0	0	0	0	0
Shelterwood Harvest								
Regeneration Cut	22,300	4,900	20,700	24,700	36,440	30,695	24,935	29,025
Final Harvest Cut	32,800	0	24,965	29,785	43,940	37,015	30,070	35,000
Clearcut	4,000	0	3,045	3,630	5,360	4,515	3,665	4,270
Single Tree Selection	900	0	685	815	1,205	1,015	825	0
Slash Disposal								
Broadcast Burning	23,700	0	18,035	21,520	31,750	26,745	21,730	0
Gross Yarding (including machine piling)	33,000	0	25,115	29,965	44,210	37,240	30,255	0
Site Preparation								
Herbicide	16,560	980	0	15,925	23,500	19,795	16,080	0
Mechanical Scarification	22,300	0	0	20,250	29,875	25,165	20,445	0
Planting								
Replant or Interplant (backlog)	11,200	0	11,200	11,200	11,200	11,200	11,200	11,200
Initial planting	30,400	2,450	25,000	29,830	44,010	37,070	30,115	13,570
Replant & Interplant (new cutting area)	12,200	1,200	10,200	12,170	17,950	15,120	12,285	5,535
Gopher Control	9,000	0	6,850	0	12,055	10,155	8,250	0
Herbicide Release	11,900	250	0	0	16,275	13,710	11,140	0
Precommercial Thinning	7,960	0	7,960	0	7,960	7,960	7,960	0
Fertilization	23,185	0	17,645	0	31,060	26,165	21,255	0
Commercial Thinning	15,225	0	15,225	0	15,225	15,225	15,225	11,955

1/ Harvest computed for allowable cut base (258,597 acres) to which is added trial harvest from low intensity lands at same rate as the proposal.
2/ Rate of harvest different for subsequent decades, see narrative for this alternative.
3/ Harvest computed for allowable cut base of existing declaration (327,270 acres).

8.1 NO CONTROL OF COMPETING VEGETATION

ALTERNATIVE NO. 1

This alternative is identical to the proposed action except that no attempt would be made to control grass, brush, or hardwood species growing in competition with commercial coniferous tree species. This would eliminate treatments for the control of competing vegetation both prior to reforestation (site preparation) and after young stands become established (stand release).

On high intensity lands the sustainable allowable cut expected to result from this option is 14.78 MM cu. ft. (86 MM bd. ft.), as shown in Figure 8-1,

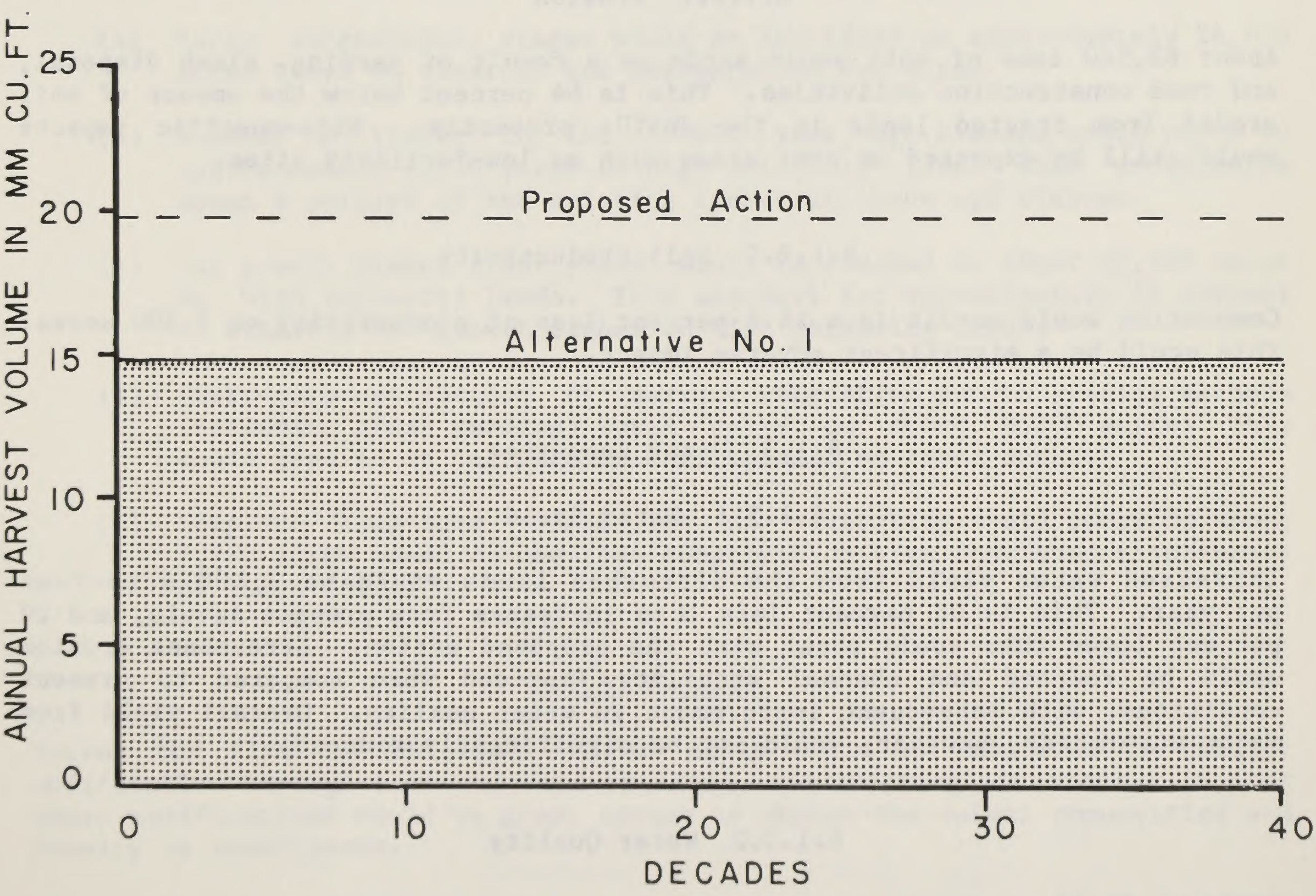


Figure 8-1 Comparison of Proposed Annual Allowable Cut with Annual Allowable Cut Using Alternative No. I

Source: BLM Forest Inventory, 1976

compared to 19.69 MM cu. ft. (115 MM bd. ft.) for the proposed action. With the additional 0.86 MM cu. ft. (5 MM bd. ft.) harvested on low intensity lands, the total planned harvest for Alternative No. 1 would be 15.64 MM cu. ft. (91 MM bd. ft.).

8.1.1 Air Quality

Burning is proposed on 18,035 acres. Maximum levels of particulate and carbon monoxide pollutants would be 42 to 43 percent above present levels, and particulates would have significant adverse impact upon air quality locally for short periods throughout the year.

8.1.2 Soils

8.1.2.1 Erosion

About 63,540 tons of soil would erode as a result of yarding, slash disposal, and road construction activities. This is 64 percent below the amount of soil eroded from treated lands in the JKSYUs presently. Site-specific impacts would still be expected on some areas such as low-fertility sites.

8.1.2.2 Soil Productivity

Compaction would result in a 14.8 percent loss of productivity on 8,200 acres. This would be a significant adverse impact.

8.1.3 Water Resources

8.1.3.1 Water Yield

Increased water yield from the disturbed lands would be 3,600 acre-feet per year. This is 66 percent less than increases from present levels, and 20 percent lower than would occur with the proposed action. Streambank erosion would be reduced and channel stability improved when compared to present conditions, with subsequent improvement in water quality. Overall yield from major watersheds, however, would not be significantly reduced.

8.1.3.2 Water Quality

Sediment Yield

Yarding, transportation and gross yarding activities would impact streams by adding 11,750 tons of sediment to them. This is 60 percent below the sediment presently added as a result of treatments and 22 percent lower than the

proposed action. This alternative would have significant adverse impacts on water quality in localized areas.

Chemical Quality

An additional 16,965 pounds of nitrogen would be added to streams as a result of clearcutting, shelterwood harvest, and slash burning. This represents an increase of less than 1 percent of that added from the areas prior to disturbance, an insignificant amount overall, but which may have localized, significant impacts.

8.1.4 Vegetation

Timber management without control of competing vegetation would produce the following significant impacts to vegetation during the first decade:

(a) Early successional stages would be initiated on approximately 24,000 acres based on clearcut and regeneration cut acres.

(b) Removal of timber in the 70-200 year age classes would occur on approximately 4,890 acres on high intensity land. This constitutes about 4 percent of the existing timber in these age classes.

(c) Old growth timber (200+ years) would be removed on about 22,500 acres on high intensity lands. This accounts for approximately 23 percent of existing old-growth timber on high intensity lands.

(d) Short-term destruction of surface vegetation due to yarding methods (including gross yarding) would occur on about 8,100 acres. This could lead to an increase in soil erosion on these acres.

(e) Complete long-term elimination of vegetation would occur on about 1,770 acres based on new road construction with continued maintenance of these roads.

8.1.5 Animals

During the first decade about 74,500 acres would be subjected to habitat modification through harvest, road building, and thinning practices. In most cases modifications would be great enough to change the animal composition and density on those acres.

Clearcuttings and shelterwood regeneration harvest would cause about a 116 percent increase in early successional stage vegetation that would benefit those species that use those habitats (see Table 2-6), and potentially could lead to a 116 percent increase in animals that use this habitat.

As no methods to control competing vegetation are proposed, the resulting early stage habitat would be diversified in composition and structure which would benefit a larger variety of animal species than would an early successional stage that had been manipulated to achieve single plant species dominance.

About 23 percent of the old growth currently existing on the high intensity lands of the JKSYUs would be harvested during the first decade. This could mean a 23 percent reduction in old-growth dependent species such as northern spotted owl, northern flying squirrel and Vaux's swift on these lands. Old growth would be eliminated on the high intensity lands of the JKSYUs by the year 2048 if this alternative were implemented.

The use of poison bait for gopher control would have an adverse impact to gophers on 6,850 acres.

Worst case analysis discloses a total of 11,750 tons of sediment (see Section 8.1.3.2) could be deposited in the streams of the JKSYUs. This could be detrimental to an individual stream and its fishery resources, but it would be insignificant to the JKSYUs as a whole.

No adverse impacts are expected to occur to any Federally listed threatened or endangered species. The Siskiyou Mountain salamander and the river otter (which are currently undergoing status review) and the northern spotted owl (a species the State of Oregon considers threatened) could have their habitat reduced and/or degraded. While individuals may be affected, the species would not be adversely impacted (See 3.6.4).

8.1.6 Recreation

Impacts would be of similar type to those of the proposed action. Health or safety hazards to recreationists would be less than under the existing situation. Hiking and sightseeing would be difficult, due to decreased visibility along roads and in the forest without control. The quality of hiking and sightseeing experiences would decrease. No significant change in visitor-days associated with general sightseeing and miscellaneous use would result.

The alteration of small, undeveloped pristine areas would total about 24,698 acres.

8.1.7 Cultural Resources

Impacts would be the same type as those resulting from the proposed action.

8.1.8 Visual Resources

Impacts would be of similar type as those of the proposed action. The use of vegetative control to create opportunities to view attractive or interesting

features would be nonexistent. Some esthetically desirable shrub species would be preserved. The adoption of this alternative would result in 29,690 acres being maintained in a more nearly natural ecological state. These areas would have more visual variety. For example, a mixed stand of hardwood and Douglas-fir would be more attractive, with more fall color. In some cases, visual variety would decrease when desired vegetative configurations cannot be developed.

8.1.9 Wilderness

Impacts would be the same as those of the proposed action.

8.1.10 Noise

Impacts of timber management operations would be similar to those of the proposed action. There would be no noise of helicopters or motorized pressure systems used in the application of herbicides.

8.1.11 Ecologically Significant Areas

Impacts to ecologically significant areas would be the same as those of the proposed action.

8.1.12 Socioeconomic Conditions

The economic analysis of each alternative is based on estimates of timber sales, harvest, and associated employment, personal income, and public revenues. Population impacts would follow patterns of timber harvest and employment. Both short-term and long-term impacts are analyzed and summarized in Tables 8-2 and 8-3, respectively. These tables also display average annual economic conditions based on 1974 to 1976 data as well as expected impacts of continued current management and the proposed action.

Short-term impacts are projected for 1980 since much of the data are projected in 10-year intervals. The nearest year to full implementation of the proposed or alternative harvest levels is 1980.

Long-term impacts are based on projected harvest levels during the second decade and expected values of economic indicators in 1990. At this point each alternative's harvest level has either reached a long-term equilibrium (sustainable yield) or is approaching it. Economic estimates were derived using methodologies similar to those used in Chapter 3.

During the first decade, average annual timber harvest would be 6 percent less than levels that would be expected from continued current management (Table 8-2). By the second decade, the annual difference would average nearly 7 percent (Table 8-3). By comparison, the proposal would vary from this alternative in terms of expected harvest by 1 percent and 2 percent respectively.

Table 8-2

Summary of Economic Impacts--Short Term

	Adjustment Factor	Units	Current Management 1974-76 Average Annual	Current Management 1980 Projected	Proposed Action 1980	ALTERNATIVES 1	2	3a	3b	4	5
Timber Supply											
BLM Timber Harvest		MM bd.ft./yr.	132	128	120	91	109	161	136	110	128
Employment (Direct)		Jobs/yr.									
Timber	6.68 1/	Jobs/yr.	990	850	810	610	730	1,080	910	730	860
Forest Development		Jobs/yr.	0	0	50	30	40	70	60	50	0
Total/Local		Jobs/yr.	990	850	860	640	770	1,150	970	780	860
Total/Nonlocal	.63 1/	Jobs/yr.	120	80	80	60	70	100	90	100	80
Employment (Direct & Indirect)											
Local	1.85 2/	Jobs/yr.	1,810	1,570	1,560	1,180	1,420	2,120	1,790	1,450	1,580
Non-Local	1.82 2/	Jobs/yr.	230	150	140	100	120	180	160	180	150
Income (Direct)	$15,424 3/	$1,000,000/yr.	14.8	13.2	13.0	9.9	11.8	17.7	14.9	12.1	13.2
Income (Direct & Indirect)	1.75 4/	$1,000,000/yr.	25.9	22.9	22.8	17.3	20.7	30.9	26.1	21.2	23.1
Public Finance											
O&C Counties	5/	$1,000,000/yr.	3.7	9.9	9.2	7.0	8.4	12.4	10.5	8.5	9.9
Tax Rate Equivalence O&C Counties	6/	$1/$1,000 TCV/yr.	.14	.28	.26	.20	.24	35	.30	.24	.28

1/ Weighted average estimate of employees per million board feet of timber harvest taken from Table 2-18 and adjusted for log flows from Jackson and Klamath units to counties of destination. Nonlocal estimate of employees taken from Table 2-16, pulp and paper employees

2/ Weighted average employment multipliers

3/ Weighted average direct income coefficient per employee = weighted average annual payroll per lumber and wood products employee X weighted average community personal income coefficient

4/ Weighted average income multiplier

5/ Public Finance = Timber harvest X stumpage price ($154/M bd. ft.) X .5

6/ Public Finance/true cash value of O&C Counties (Appendix I, Table I-2)

Table 8-3

Summary of Economic Impacts--Long Term

	Adjustment Factor	Units	Current Management 1974-76 Average Annual	Current Management 1990 Projected	Proposed Action 1990	ALTERNATIVES 1	2	3a	3b	4	5
Timber Supply											
BLM Timber Harvest		MM bd.ft./yr.	132	128	115	91	109	115	131	112	128
Employment (Direct)		Jobs/yr.									
Timber	5.87 1/	Jobs/yr.	990	760	680	530	640	670	770	660	750
Forest Development		Jobs/yr.	0	0	50	30	40	70	60	50	0
Total/Local		Jobs/yr.	990	760	730	560	680	740	830	710	750
Total/Nonlocal	.57 1/	Jobs/yr.	120	70	70	50	60	70	70	60	70
Employment (Direct & Indirect)											
Local	1.85 2/	Jobs/yr.	1,810	1,390	1,320	1,040	1,260	1,380	1,530	1,310	1,390
Non-Local	1.82 2/	Jobs/yr.	230	130	120	90	110	120	140	120	130
Income (Direct)	$16,100 3/	$1,000,000/yr.	14.8	12.0	11.7	9.0	10.9	12.0	13.3	11.4	12.1
Income (Direct & Indirect)	1.75 4/	$1,000,000/yr.	25.9	21.0	20.3	15.8	19.2	21.0	23.4	19.9	21.2
Public Finance											
O&C Counties	204 5/	$1,000,000/yr.	3.7	13.1	11.7	9.3	11.1	11.7	13.4	11.4	13.1
Tax Rate Equivalence O&C Counties	6/	$1/$1,000 TCV/yr.	.14	.37	.33	.26	.32	33	.38	.32	.37

1/ Weighted average estimate of employees per million board feet of timber harvest taken from Table 2-18 and adjusted for log flows from Jackson and Klamath units to counties of destination. Nonlocal estimate of employees taken from Table 2-16, pulp and paper employees

2/ Weighted average employment multipliers

3/ Weighted average direct income coefficient per employee = weighted average annual payroll per lumber and wood products employee X weighted average community personal income coefficient

4/ Weighted average income multiplier

5/ Public Finance = Timber harvest X stumpage price ($204/M bd. ft.) X .5

6/ Public finance/true cash value of O&C Counties (Appendix I, Table I-2)

During the first decade, direct local employment generated by BLM timber harvest would be about 30 percent less than with either current management or the proposal. The impacts on total (direct plus indirect) employment would follow trends in direct employment. Initially, fewer (the equivalent of about 390 and 338 less) local jobs would be generated by this alternative than either continued current management or by the proposal respectively. However, after the first decade the differences in total jobs would decline.

Each year about $3.3 million and $3.1 million less direct personal income would be generated than with current management or the proposal, respectively. Total (direct plus indirect) income impacts would follow similar patterns.

Initially, average annual public revenues to O&C counties would be an estimated $2.9 and $2.2 million less than from continued current management or the proposed action respectively. By the 1990's, the respective differences would be $3.8 million and $2.4 million.

Local residents would perceive a loss of social and economic well-being. Opposition would be expected from local government and organizations that benefit from O&C payments. Limited revenues would cause certain government projects and programs to be reduced or eliminated while greater demands for social aid would come from those unemployed or underemployed in the timber industry. This would support the view that there is a need for more and faster local economic diversification. BLM policies and management decisions would be more strongly opposed and BLM could be accused of treating local input as irrelevant. The BLM's ability to efficiently manage timber would certainly lose credibility among foresters and others in the timber industry.

Those opposed to herbicide spraying because of health concerns would perceive improved social well-being. However, those whose opposition to herbicides is based on their preference for substituting manual labor for chemical control of competing vegetation wouldn't realize any improved social or economic well-being.

8.1.13 Health

Possible adverse impacts to human health caused by herbicides would not occur since no herbicides would be used under this alternative.

8.1.14 Energy Use

Total energy consumption would be approximately 1.148 trillion Btu's.

8.2 LIMITED INVESTMENT IN TIMBER PRODUCTION

ALTERNATIVE NO. 2

This alternative differs from the proposal in that management practices would be limited to those associated with final timber harvest and artificial reforestation. Planned practices would include road construction, shelterwood harvest and clearcutting, slash disposal, site preparation (with herbicides where warranted) and planting.

On high intensity lands the sustainable allowable cut resulting from this alternative would be 17.80 MM cu. ft. (104 MM bd. ft.), as shown in Figure 8-2. The additional 0.86 MM cu. ft. (5 MM bd. ft.) harvested on low intensity lands would bring the total planned harvest for Alternative No. 2 to 18.66 MM cu. ft. (109 MM bd. ft.).

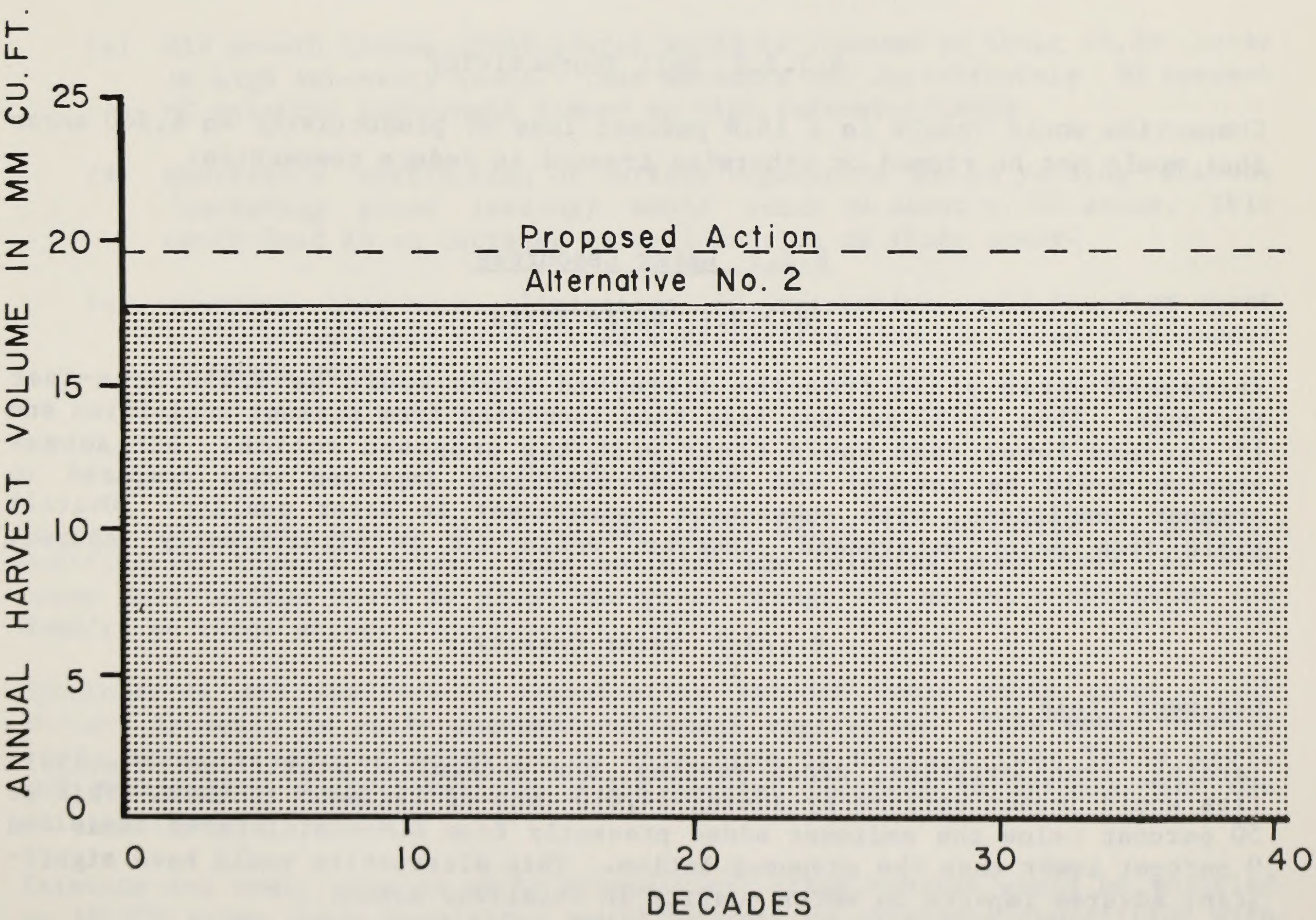


Figure 8-2 Comparison of Proposed Annual Allowable Cut with Annual Allowable Cut Using Alternative No. 2

Source: BLM Forest Inventory, 1976

8.2.1 Air Quality

Burning is proposed on 21,520 acres. Maximum levels of particulate and carbon monoxide pollutants would be 50 to 51 percent above present levels, and particulates would have significant adverse impact upon air quality locally for short periods throughout the year.

8.2.2 Soils

8.2.2.1 Erosion

About 63,885 tons of soil would erode as a result of yarding, slash disposal, and road construction activities. This is 64 percent below the amount of soil eroded from treated lands in the JKSYUs presently. Site-specific impacts would still be expected on some areas such as low-fertility sites.

8.2.2.2 Soil Productivity

Compaction would result in a 14.8 percent loss of productivity on 6,360 acres that would not be ripped or otherwise treated to reduce compaction.

8.2.3 Water Resources

8.2.3.1 Water Yield

Increased water yield from the disturbed lands would be 3,650 acre-feet per year. This is 66 percent less than increases from present activities and 19 percent lower than would occur with the proposed action. Streambank erosion would be reduced and channel stability improved when compared to present conditions, with subsequent improvement in water quality. Overall yield from major watersheds, however, would not be significantly reduced.

8.2.3.2 Water Quality

Sediment Yield

Yarding, transportation, gross yarding, and mechanical scarification activities would impact streams by adding 14,010 tons of sediment to them. This is 50 percent below the sediment added presently from BLM-administered lands and 9 percent lower than the proposed action. This alternative would have significant adverse impacts on water quality in localized areas.

Chemical Quality

An additional 20,245 pounds of nitrogen would be added to streams as a result of clearcutting, shelterwood harvest, and slash burning. This repre-

sents an increase of less than 1 percent of that added from the areas prior to disturbance, an insignificant amount overall, but may have localized, significant impacts.

8.2.4 Vegetation

Timber management with limited emphasis on forest development practices would produce the following impacts to vegetation during the first decade:

(a) Early successional stages would be initiated on approximately 28,300 acres based on clearcut and regeneration cut acres.

(b) Removal of timber in the 70-200 year age classes would occur on approximately 6,865 acres on high intensity land. This constitutes about 5 percent of the existing timber in these age classes.

(c) Old growth timber (200+ years) would be removed on about 29,700 acres on high intensity lands. This accounts for approximately 30 percent of existing old-growth timber on high intensity lands.

(d) Short-term destruction of surface vegetation due to yarding methods (including gross yarding) would occur on about 9,700 acres. This could lead to an increase in soil erosion on these areas.

(e) Complete long-term elimination of vegetation would occur on about 1,770 acres based on new road construction with continued maintenance of these roads.

8.2.5 Animals

During the first decade about 60,500 acres would be subjected to habitat modification through harvest, road building and thinning practices. In most cases modification would be great enough to change the animal composition and density on those acres.

Clearcutting and shelterwood regeneration harvest would cause about a 158 percent increase in early successional stage vegetation. This would benefit those species adapted to exist on this type of habitat (see Table 2-6), and potentially could result in a 158 percent increase in animals that use this habitat.

Existing and newly created early successional stage habitat would be modified on 16,000 acres where herbicides would be used to eliminate competition with favored conifers. This would reduce the value of these acres to many animal species by reducing plant structure, diversity, and density.

About 30 percent of the old growth currently existing on the high intensity lands of the JKSYUs would be harvested during the first decade. This could

mean a 30 percent reduction in old-growth dependent species occurring on those lands. Old growth would be eliminated on the high intensity lands of the JKSYUs by the year 2028 if this alternative were implemented.

Worst case analysis discloses a total of 14,010 tons of sediment (see Section 8.2.3.2) could be deposited in the streams of the JKSYUs. This could be detrimental to an individual stream and its fishery resources but it would be insignificant to the JKSYUs as a whole.

No adverse impacts are expected to occur to any Federally-listed threatened or endangered species. The Siskiyou Mountain salamander and the river otter (which are currently undergoing status review) and the northern spotted owl (a species the State of Oregon considers threatened) could have their habitat reduced and/or degraded. While individuals may be affected, the species are not expected to be adversely impacted (see 3.6.4).

8.2.6 Recreation

Impacts resulting from the implementation of this alternative would be similar to those of the proposed action.

Elimination of thinning would mean less alteration of the recreational experience than under the existing situation. Fewer areas and opportunities for hiking would be created. Sightseeing and miscellaneous use would slightly decrease, insofar as thinning could not be used to enhance the environment by increasing depth of view or by changing form, line, texture, color and vegetative groupings. Water quality degradation and related impacts upon fish populations and fishing success would not be as widespread as under the existing situation. Fishing use would slightly increase. With the elimination of commercial thinning, some hazard trees might remain standing and endanger recreationists.

With approximately 58,930 acres proposed for harvest under this alternative, about 29,465 acres would be new ground, previously undisturbed and possessing opportunities for solitude and serenity.

8.2.7 Cultural Resources

Unidentified cultural resources could be inadvertently damaged or destroyed.

8.2.8 Visual Resources

This alternative would result in some short-term adverse impacts and would also hinder long-term enhancement effects resulting from changes in form, line, texture, color and/or vegetative groupings.

8.2.9 Wilderness

Impacts would be the same as those delineated in Chapter 3.

8.2.10 Noise

Some noise intrusiveness would occur.

8.2.11 Ecologically Significant Areas

Impacts would be the same as those of the proposed action. Impacts occur primarily during harvest and include disruption of vegetation, soil compaction, erosion, and in some cases disturbance of unique animal or plant species.

8.2.12 Socioeconomic Conditions

Average annual timber harvest within the timbershed would be about 3 percent less than expected from continued current management.

During the first decade, annual direct local employment, as well as total (direct plus indirect) employment, generated by BLM timber harvest would be about 10 percent less than from continued current management. The magnitude of corresponding differences among income impacts would be similar (Table 8-2). However, public revenues would be about 15 percent less.

Although the amount of employment, income, and public revenues would change by the 1990's, the relative differences between this alternative and annual impacts from continued current management would be about the same (Refer to Table 8-3).

This alternative would also be generally perceived as reducing local social welfare. The initial average reduction in harvest would contribute to the instability of the timber industry. Since average annual O&C payments would decline, opposition could be expected from local governments. BLM would be perceived by many as inefficiently managing timber for adopting a "weak" management plan with no purpose or direction. Local residents would generally feel that their concerns and welfare were either ignored or considered irrelevant in the decisionmaking process.

8.2.13 Health

Herbicide use is planned on 15,925 acres under this alternative. This is a significant increase over the present situation where no herbicides are used, and a 46 percent decrease from the proposed action. The impacts to human health would be expected to be similar in nature to those of the proposed action.

8.2.14 Energy Use

Total energy consumption would be approximately 1.34 trillion Btu's.

8.3 UTILIZATION OF SURPLUS INVENTORY

ALTERNATIVE NO. 3

This alternative differs from the proposal in that surplus growing stock which contributes nothing to the attainable level of sustained yield allowable cut would be harvested at an accelerated rate. Surplus growing stock is in excess of that needed in allowable cut calculation to provide constant or increasing timber supply over time (see Section 1.2.6.2). Utilization of the surplus on a shorter timeframe would only slightly hasten achievement of a regulated forest in the JKSYUs due to the present distribution of age classes.

The alternative has two options: utilization of the surplus inventory during a) one decade, or b) two decades. Under either option the forest could still sustain a harvest of 19.69 MM cu. ft. (115 MM bd. ft.) per year in the future decades. The objective would be to assist in meeting anticipated short-run national housing needs.

The allowable cut on high intensity lands for Alternative No. 3a would be 26.67 MM cu. ft. (156 MM bd. ft.) for one decade as shown in Figure 8-3. With the additional harvest of 0.86 MM cu. ft. (5 MM bd. ft.) on low intensity lands, the total planned harvest for this option would be 27.53 MM cu. ft. (161 MM bd. ft.).

If the accelerated harvest were extended over two decades, the allowable cut on high intensity lands expected to result from option 3b would be 22.33 MM cu. ft. (131 MM bd. ft.) for two decades as shown in Figure 8-4. The additional 0.86 MM cu. ft. (5 MM bd. ft.) harvested on low intensity lands would bring the total planned harvest for the first decade of this option to 23.19 MM cu. ft. (136 MM bd. ft.).

This alternative would be within the new policy guidelines announced by the Secretary of the Interior in June 1979 which permit temporary annual increases in timber harvest from BLM lands.

8.3a UTILIZATION OF SURPLUS INVENTORY WITHIN ONE DECADE

8.3a.1 Air Quality

Burning is proposed on 31,750 acres. Maximum levels of particulate and carbon monoxide pollutants would be 74 to 75 percent above present levels, and particulates would have significant adverse impact upon air quality locally for short periods throughout the year.

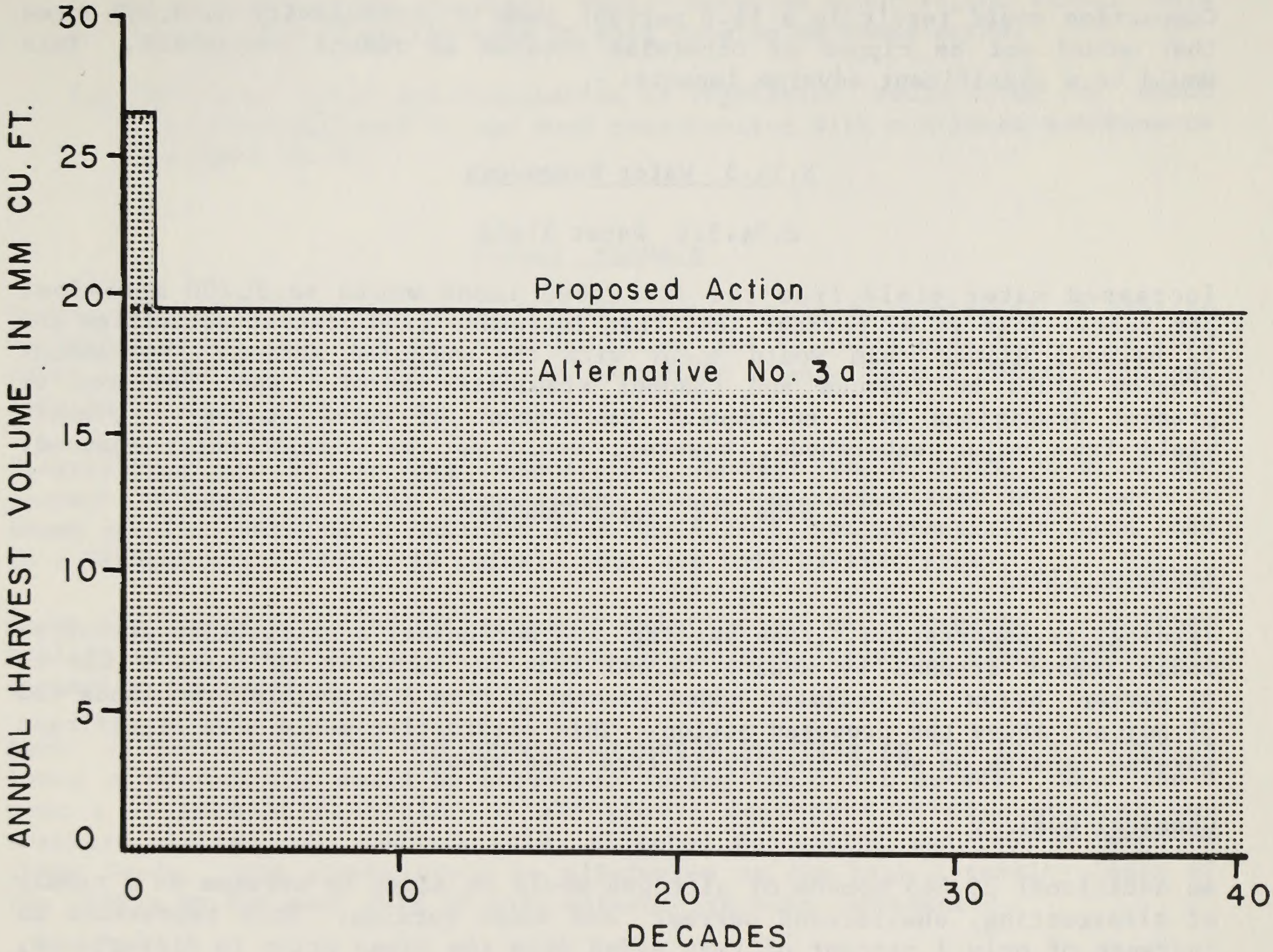


Figure 8-3 Comparison of Proposed Annual Allowable Cut with Annual Allowable Cut Using Alternative No. 3a

Source: BLM Forest Inventory, 1976

8.3a.2 Soils

8.3a.2.1 Erosion

Yarding, slash disposal, and road construction activities would cause about 65,635 tons of soil to erode. This is 63 percent below the amount of soil eroded from treated lands in the JKSYUs presently. Site-specific impacts would still be expected on some areas, such as low-fertility sites.

8.3a.2.2 Soil Productivity

Compaction would result in a 14.8 percent loss of productivity on 9,500 acres that would not be ripped or otherwise treated to reduce compaction. This would be a significant adverse impacts.

8.3a.3 Water Resources

8.3a.3.1 Water Yield

Increased water yield from the disturbed lands would be 5,700 acre-feet per year. This is 47 percent less than increases from present activities and 27 percent higher than would occur with the proposed action. Streambank erosion would be reduced and channel stability improved when compared to present conditions with subsequent improvement of water quality. Overall yield from major watersheds, however, would not be significantly reduced.

8.3a.3.2 Water Quality

Sediment Yield

Yarding, transportation, gross yarding and mechanical scarification activites would impact streams by adding 19,695 tons of sediment to them. This is 31 percent below the sediment added presently from BLM-administered lands and 31 percent above the proposed action. This alternative would have significant adverse impacts on water quality in localized areas.

Chemical Quality

An additional 29,865 pounds of nitrogen would be added to streams as a result of clearcutting, shelterwood harvest and slash burning. This represents an increase of only 1 percent of that added from the areas prior to disturbance, an insignificant amount overall, but a significant localized impact.

8.3a.4 Vegetation

Utilization of surplus inventory during a period of one decade would produce the following significant impacts to vegetation:

(a) Early successional stages would be initiated on approximately 41,800 acres based on clearcut and regeneration cut acres.

(b) Removal of timber in the 70-200 year age classes would occur on approximately 10,110 acres on high intensity land. This constitutes about 8 percent of the existing timber in these age classes.

(c) Old-growth timber (200+ years) would be removed on about 41,200 acres on high intensity lands. This accounts for approximately 42 percent of existing old-growth timber on high intensity lands.

(d) Short-term destruction of surface vegetation due to yarding methods (including gross yarding) would occur on about 14,200 acres. This could lead to an increase in soil erosion on these acres.

(e) Complete long-term elimination of vegetation would occur on about 1,770 acres based on new road construction with continued maintenance of these roads.

8.3a.5 Animals

During the initial decade about 112,000 acres would be subjected to habitat modification through harvest, road building, and thinning practices. In most cases, modifications would be great enough to change animal composition and density on those acres.

Clearcutting and shelterwood regeneration harvest would cause about a 280 percent increase in early successional stage vegetation that would benefit those species using those habitats (See Table 2-6), and potentially could lead to a 280 percent increase in animals that use this habitat type.

Herbicide use on about 40,000 acres of existing and newly created early stage habitat would lower the value of these habitats by reducing plant structure, diversity and density.

About 42 percent of the old growth currently existing on the high intensity lands of the JKSYUs would be harvested during the first decade. This could mean a 42 percent reduction of old-growth dependent species such as the northern spotted owl, redback vole, pileated woodpecker and Vaux's swift on those lands. Old growth would be eliminated on the high intensity lands of the JKSYUs by the year 2018 if this alternative were implemented.

The use of poison bait for gopher control would have an adverse impact to gophers on the 12,000 acres so treated.

Worst case analysis discloses a total of 19,695 tons of sediment (see Section 8.3a.3.2) could be deposited in the streams of the JKSYUs. This could be detrimental to an individual stream and its fishery resource, but it would be insignificant to the JKSYUs as a whole.

No adverse impacts are expected to occur to any Federally listed threatened or endangered species. The Siskiyou Mountain salamander and the river otter (which are currently undergoing status review) and the northern spotted owl (a species the State of Oregon considers threatened) could have their habitat reduced and/or degraded. While individuals may be affected, the species would not be adversely impacted (see Section 3.6.4).

8.3a.6 Recreation

Impacts resulting from the implementation of this alternative would be similar to those of the proposed action. Forest visitors and recreationists who enjoy

viewing old-growth specimens would be adversely affected by this alternative. A slight reduction in visitor days associated with general sightseeing and miscellaneous use would occur.

Water quality degradation would result in decreased fishing use. Increased old-growth harvest would result in the loss of some opportunities to experience solitude and isolation in primitive-type areas. Hunting, camping and ORV use would slightly increase.

The destruction of small, undeveloped pristine areas could occur since an estimated 43,473 acres proposed for harvest under this alternative are presently undisturbed.

8.3a.7 Cultural Resources

Impacts would be the same type as those of the proposed action.

The intensified cutting of old growth during the first decade would adversely affect those people who regard specimens of old growth as examples of "living history."

Increased timber cutting in the first decade would probably cause some unidentified cultural resources to be inadvertently damaged or destroyed.

8.3a.8 Visual Resources

During the first decade this alternative would result in significant landscape alteration and contrast. Impacts would be identical to those of the proposed action. Forest visitors who extol the virtues and grandeur of old growth and who enjoy viewing these specimens would be especially prone to adverse impacts during the first decade.

8.3a.9 Wilderness

Impacts would be the same as those of the proposed action. Wilderness or primitive values on O&C lands suitable for sustained yield timber management could be lost in the next decade under this alternative.

8.3a.10 Noise

During the first decade the impacts of noise intrusiveness would be the same as those of the proposed action.

8.3a.11 Ecologically Significant Areas

Impacts would be of the same type as those delineated in Chapter 3. Areas with ecological values may realize impacts in the next decade under this alternative.

8.3a.12 Socioeconomic Conditions

During the first decade average annual timber harvest within the Medford timbershed would be 5 percent higher than harvest levels with continued current managment. However, by the second decade, this alternative′s timber harvest would be 2 percent less than with current management.

In the 1980′s, annual local employment and personal income generated by BLM timber harvest would be about 35 percent more than with current management, while public revenues would be about 25 percent greater. By the 1990′s, this would change significantly. Employment, income and public revenues would be approximately the same with this alternative as with current management. This harvest alternative would involve a significant initial increase in employment, local personal income and public revenues, and an even more dramatic decline in these indicators (i.e. employment, income and public revenues) between the first and second decades. The initial extra volume could offset reductions in timber harvest volume expected from other BLM SYUs, as well as other public and private sources.

Adoption of this alternative would result in a mixed local reaction. Although the initial increased harvest would probably be welcomed by loggers, mill operators and other business people affected by the timber industry, this alternative would delay the overall decline in timber harvest. However, unless other sources of timber become available in the 1990′s, an annual 41 MM. bd. ft. decline in available timber from the 1980′s level would occur.

This alternative would be perceived by some as an extreme policy of maximizing timber production while sacrificing other considerations, e.g., preserving old growth and visual resources, and stabilizing wildlife habitat. Consequently, those who put more emphasis on these other considerations would perceive reduction in quality of life. Those opposed to the use of herbicides would also perceive a loss of social well-being because of the increased herbicide use.

8.3a.13 Health

Herbicide use is planned on 39,775 acres under this alternative. This is a significant increase over the present situation where no herbicides are used, and a 34 percent increase from the proposed action. The impacts to human health would be expected to be similar in nature to those of the proposed action.

8.3a.14 Energy Use

Total energy consumption would be approximately 1.971 trillion Btu′s.

8.3b UTILIZATION OF SURPLUS INVENTORY WITHIN TWO DECADES

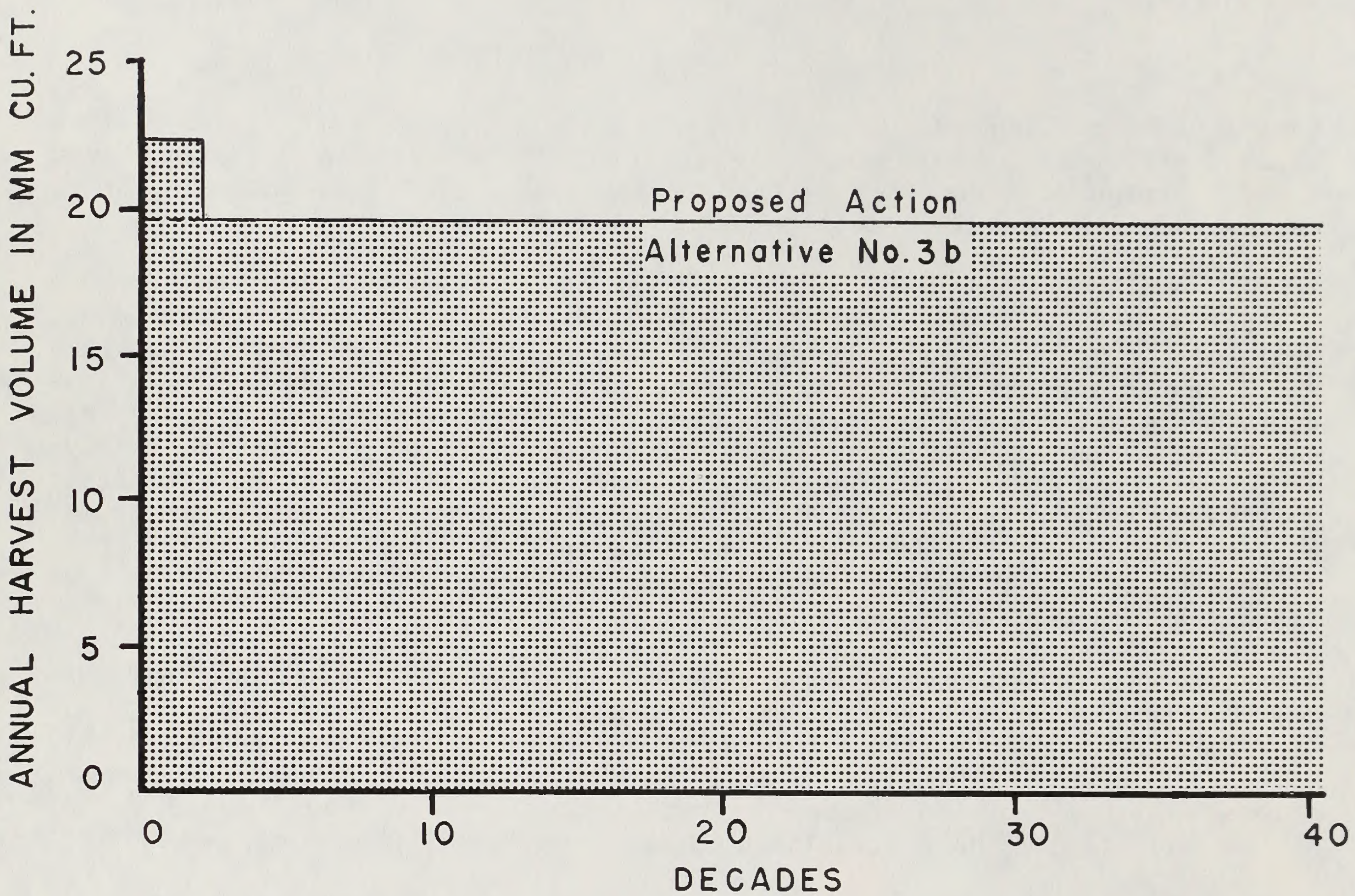


Figure 8-4 Comparison of Proposed Annual Allowable Cut with Annual Allowable Cut Using Alternative No.3b
Source: BLM Forest Inventory, 1976

8.3b.1 Air Quality

Burning is proposed on 26,745 acres. Maximum levels of particulate and carbon monoxide pollutants would be 63 percent above present levels, and particulates would have significant adverse impact upon air quality locally for short periods throughout the year.

8.3b.2 Soils

8.3b.2.1 Erosion

About 64,870 tons of soil would erode as a result of yarding, slash disposal and road construction activites. This is 64 percent less than the amount of soil eroded from treated lands in the JKSYUs presently. Site-specific impacts would still be expected on some areas such as low-fertility sites.

8.3b.2.2 Soil Productivity

Compaction would result in a 14.8 percent loss of productivity on 8,025 acres that would not be ripped or otherwise treated to reduce compaction. This would be a significant adverse impact.

8.3b.3 Water Resources

8.3b.3.1 Water Yield

Increased water yield from the BLM-administered lands would be 5,200 acre-feet per year. This is 51 percent less than increases from present activities and 15 percent greater than would occur with the proposed action. Streambank erosion would be reduced and channel stability improved when compared to present conditions, with subsequent improvement of water quality. Overall yield from major watersheds, however, would not be significantly reduced.

Chemical Quality

An additional 25,160 pounds of nitrogen would be added to streams as a result of clearcutting, shelterwood harvest and slash burning. This represents an increase of less than 1 percent of that added from the areas prior to disturbances, an insignificant amount overall, but a significant localized impact.

8.3b.3.2 Water Quality

Sediment Yield

Yarding, transportation, gross yarding and mechanical scarification activities would impact streams by adding 17,220 tons of sediment to them. This is 39 percent less than the present situation and 15 percent above the proposed action. This alternative would have significant adverse impacts on water quality in localized areas.

8.3b.4 Vegetation

Utilization of surplus inventory during a period of two decades would produce the following significant impacts to vegetation:

(a) Early successional stages would be initiated on approximately 35,200 acres based on clearcut and regeneration cut acres.

(b) Removal of timber in the 70-200 year age classes would occur on approximately 8,025 acres on high intensity land. This constitutes about 6 percent of the existing timber in these age classes.

(c) Old-growth timber (200+ years) would be removed on about 34,500 acres on high intensity lands. This accounts for approximately 35 percent of existing old-growth timber on high intensity lands.

(d) Short-term destruction of surface vegetation due to yarding methods (including gross yarding) would occur on about 12,000 acres. This could lead to an increase in soil erosion on these acres.

(e) Complete long-term elimination of vegetation would occur on about 1,770 acres based on new road construction with continued maintenance of these roads.

8.3b.5 Animals

During the first decade approximately 98,000 acres would be subjected to habitat modification by harvest, road building and thinning practices. In most cases, modifications would be great enough to change animal composition and density on those acres.

Clearcutting and shelterwood regeneration harvest would cause about a 220 percent increase in early successional stage vegetation that would benefit those species using those habitats (see Table 2-6), and potentially could lead to a 220 percent increase in animals that use this habitat.

Herbicide use on about 33,500 acres of existing and newly created early stage habitat would lower the value of those habitats by reducing plant structure, diversity and density.

About 35 percent of the old growth currently existing on the high intensity lands of the JKSYUs would be harvested during the first decade. This could mean a 35 percent reduction of old-growth dependent species such as the northern spotted owl, redback vole and pileated woodpecker on these lands. Old growth would be eliminated on the high intensity lands of the JKSYUs by the year 2018 if this alternative were implemented.

The use of poison bait for gopher control would have an adverse impact to gophers on the 10,000 acres so treated.

Worst case analysis discloses a total of 17,220 tons of sediment (see Section 8.3b.3.2) could be deposited in the streams of the JKSYUs. This could be detrimental to an individual stream and its fishery resource, but it would be insignificant to the JKSYUs as a whole.

No adverse impacts are expected to occur to any Federally-listed threatened or endangered species. The Siskiyou Mountain salamander and the river otter (which are currently undergoing status review) and the northern spotted owl (a species the State of Oregon considers threatened) could have their habitat reduced and/or degraded. While individuals may be affected, the species would not be impacted (see Section 3.6.4).

8.3b.6 Recreation

Impacts resulting from the implementation of this alternative would be similar to those of the proposed action.

Forest visitors and recreationists who enjoy viewing old-growth specimens would be adversely affected by this alternative. A slight reduction in visitor days associated with general sightseeing and miscellaneous use would occur.

Fishing use would slightly decrease as a result of water quality degradation. Increased old-growth harvest would result in the loss of some opportunities to experience solitude and isolation in primitive-type areas. Hunting, camping and ORV use would slightly increase.

The destruction of small, undeveloped pristine areas could occur since an estimated 36,620 acres proposed for harvest under this alternative are presently undisturbed.

8.3b.7 Cultural Resources

Impacts would be similar to those of the proposed action.

The intensified cutting of old growth during the first two decades would adversely affect those people who regard specimens of old growth as examples of "living history." Increased timber cutting in the first two decades would cause some unidentified cultural resources to be inadvertently damaged or destroyed.

8.3b.8 Visual Resources

During the first two decades this alternative would result in significant landscape alteration and contrast. Impacts would be identical to those of the proposed action. Forest visitors who extol the virtues and grandeur of old growth and who enjoy viewing these specimens would be especially prone to adverse impacts during the first two decades.

8.3b.9 Wilderness

Impacts would be the same as those of the proposed action. There is a good possibility that O&C lands suitable for sustained yield timber management and

possessing wilderness or primitive values could be harvested in the next two decades under this alternative.

8.3b.10 Noise

During the first two decades the impacts of noise intrusiveness would be the same as those of the proposed action.

8.3b.11 Ecologically Significant Areas

Impacts would be the same as those delineated in Chapter 3. There is a good possibility that areas with ecological values may realize impacts in the next two decades.

8.3b.12 Socioeconomic Conditions

Initially, the average timber harvest within the Medford timbershed would be about 1 percent higher than expected from continued current management and approximately equal during the 1990's.

Annual local employment and personal income generated by the annual harvest would be about 14 percent higher and public revenues would be about 6 percent greater than would be expected from current management. By the 1990's, the magnitude of the respective annual differences would be about 9 percent and 1 percent (refer to Tables 8-2 and 8-3).

This alternative would have the effect of stabilizing the timber industry in the short term and easing its inevitable decline locally.

Unlike Alternative No. 3a, this alternative would probably receive a positive reaction by local government, businesses, the timber industry and others concerned with preserving the stability of the timber industry. Other social impacts would be basically similar to those described in the socioeconomic analysis of Alternative 3a.

8.3b.13 Health

Herbicide use is planned on 33,505 acres under this alternative. This is a significant increase over the present situation where no herbicides are used, and a 13 percent increase from the proposed action. The impacts to human health would be expected to be similar in nature to those of the proposed action.

8.3b.14 Energy Use

Total energy consumption would be approximately 1.679 trillion Btu's.

8.4 FORESTRY PROGRAM FOR OREGON

ALTERNATIVE NO. 4

This alternative would provide the Jackson and Klamath SYUs' pro rata share of BLM timber harvest called for in the Forestry Program for Oregon (Oregon State Board of Forestry 1977).

This share would be provided by sequential decadal allowable harvests of 18.84 MM cu. ft. (110 MM bd. ft.), 19.18 MM cu. ft. (112 MM bd. ft.), 20.37 MM cu. ft. (119 MM bd. ft.), 21.57 MM cu. ft. (126 MM bd. ft.) for the next four decades. The capacity of the JKSYUs to sustain these cuts, however, would cease at the end of the fourth decade. The sustainable allowable cut beyond that point would be 19.69 MM cu. ft. (115 MM bd. ft.) as shown in Figure 8-5.

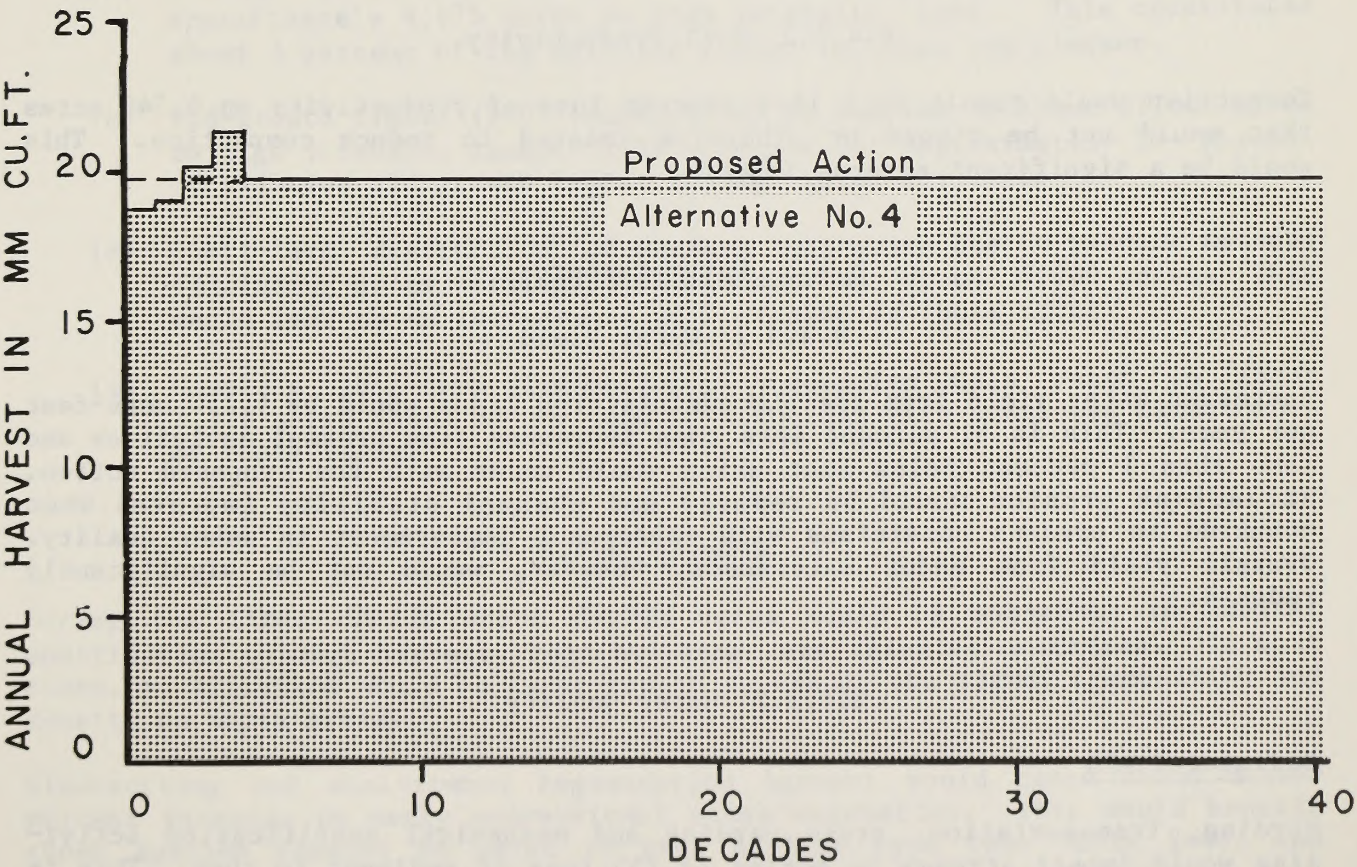


Figure 8-5 Comparison of Proposed Annual Allowable Cut with Annual Allowable Cut Using Alternative No. 4
Source: BLM Forest Inventory, 1976

8.4.1 Air Quality

Burning is planned on 21,730 acres. Maximum levels of particulate and carbon monoxide pollutants would be 51 percent above present levels. Particulates would have significant adverse impact upon air quality locally for short periods throughout the year.

8.4.2 Soils

8.4.2.1 Erosion

About 64,100 tons of soil would erode as a result of yarding, slash disposal and road construction activities. This is 64 percent below the amount of soil eroded from treated lands in the JKSYUs presently. Site-specific impacts would still be expected on some areas such as low-fertility sites.

8.4.2.2 Soil Productivity

Compaction would result in a 14.8 percent loss of productivity on 6,540 acres that would not be ripped or otherwise treated to reduce compaction. This would be a significant adverse impact.

8.4.3 Water Resources

8.4.3.1 Water Yield

Increased water yield from the BLM-administered lands would be 4,150 acre-feet per year. This is 61 percent less than increases from present activities and less than 1 percent below that which would occur with the proposed action. Streambank erosion would be reduced and channel stability improved when compared to present conditions with subsequent improvement in water quality. Overall yield from major watersheds, however, would not be significantly reduced.

8.4.3.2 Water Quality

Sediment Yield

Yarding, transportation, gross yarding and mechanical scarification activities would impact streams by adding 14,755 tons of sediment to them. This is 48 percent below the sediment added from BLM-administered lands presently and 2 percent less than the proposed action. This alternative would have significant adverse impacts on water quality in localized areas.

Chemical Quality

An additional 20,440 pounds of nitrogen would be added to streams as a result of clearcutting, shelterwood harvest and slash burning. This represents an increase of less than 1 percent of that added from the areas prior to disturbance, an insignificant amount overall, but significant in localized areas.

8.4.4 Vegetation

Adoption of the Forestry Program for Oregon recommendations would result in the following significant impacts to vegetation during the first decade:

(a) Early successional stages would be initiated on approximately 28,600 acres based on clearcut and regeneration cut acres.

(b) Removal of timber in the 70-200 year age classes would occur on approximately 6,675 acres on high intensity land. This constitutes about 5 percent of the existing timber in these age classes.

(c) Old-growth timber (200+ years) would be removed on about 27,000 acres on high intensity lands. This accounts for approximately 27 percent of existing old-growth timber on high intensity lands.

(d) Short-term destruction of surface vegetation due to yarding methods (including gross yarding) would occur on about 9,700 acres. This could lead to an increase in soil erosion on these acres.

(e) Complete long-term elimination of vegetation would occur on about 1,770 acres based on new road construction with continued maintenance of these roads.

8.4.5 Animals

During the first decade about 84,500 acres would be subjected to habitat modification through harvest, road building and thinning practices. In most cases, modification would be great enough to change the animal composition and density on those acres.

Clearcutting and shelterwood regeneration harvest would cause about a 160 percent increase in early successional stage vegetation. This would benefit those species adapted to exist in this habitat type (see Table 2-6), and potentially could lead to a 160 percent increase in animals that use this habitat.

Existing and newly created early successional stage habitat would be modified on 27,220 acres by herbicides used to eliminate competition with favored conifers. This would lower the value of these acres to many animal species by reducing plant structure, diversity and density.

About 27 percent of the old growth currently existing on the high intensity lands of the JKSYUs would be harvested during the first decade. This could result in a 27 percent reduction of old-growth dependent species such as the northern spotted owl, redback vole and pileated woodpecker on those lands. Old growth would be eliminated on the high intensity lands of the JKSYUs by the year 2028 if this alternative were implemented.

The use of poison bait for gopher control would have an adverse impact to gophers on the 8,250 acres so treated.

Worst case analysis discloses a total of 14,755 tons of sediment (see Section 8.4.3.2) could be deposited in the streams of the JKSYUs. This could be detrimental to an individual stream and its fishery resource, but it would be insignificant to the JKSYUs as a whole.

No adverse impacts are expected to occur to any Federally listed threatened or endangered species. The Siskiyou Mountain salamander and the river otter (which are currently undergoing status review) and the northern spotted owl (a species the State of Oregon considers threatened) could have their habitat reduced or degraded. While individuals may be affected, the species would not be impacted (see Section 3.6.4).

8.4.6 Recreation

Increasing timber management activity during the first four decades would correlate with increasing degradation and alteration of the recreation experience. High quality recreation opportunites would be most available during the first two decades. During the third and fourth decades, recreation resources would be adversely impacted by timber management and road construction activities. Approximately 29,748 acres of harvested land would be previously undisturbed areas. While hunting, camping and ORV use would probably increase; general sightseeing, fishing and miscellaneous use reductions would be expected.

8.4.7 Cultural Resources

For the first four decades, increasing timber management activity and associated ground surface disturbance would cause some unidentified cultural sites to be inadvertently damaged or destroyed.

8.4.8 Visual Resources

The effects of intensified old-growth harvest would adversely impact those people who appreciate the transcendent beauty of these specimens. Impacts of this alternative would be the same as those for the proposed action.

8.4.9 Wilderness

Impacts would be the same as those of the proposed action.

8.4.10 Noise

The impacts of noise intrusiveness would steadily increase until the fifth decade when a reduction in timber management activity is expected.

8.4.11 Ecologically Significant Areas

Impacts would be the same as those of the proposed action.

8.4.12 Socioeconomic Conditions

Average annual timber harvest within the Medford timbershed would be expected to be about 3 percent less than with current management both in the short term and the long term.

Annual local employment and personal income generated by the annual harvest would be about 9 percent less than with current management while public revenues would be about 14 percent less. By the 1990's, these respective annual differences would amount to about 7 percent and 13 percent.

Social impacts would be approximately equal to those of the proposed action.

8.4.13 Health

Herbicide use is planned on 27,220 acres under this alternative. This is a significant increase over the present situation where no herbicides are used, and an 8 percent decrease from the proposed action. The impacts to human health would be expected to be similar in nature to those of the proposed action.

8.4.14 Energy Use

Total energy consumption would be approximately 1.376 trillion Btu's.

8.5 NO ACTION

ALTERNATIVE NO. 5

This alternative specifies continuation of the current level of timber management. That means continuation of the present allowable cut of 21.93 MM cu.

ft. (128 MM bd. ft.) which was computed in 1970 from a commercial forest base of 327,270 acres. As shown in Figure 8-6, the combined JKSYUs can maintain this level of harvest for 10 decades. This alternative assumes continuation of the same level of management and, except for road construction, the same management practices as projected in 1970. For this alternative the level of road construction expected to take place during the next 10 years is assumed to be the same as that of the proposed action since the major road systems have already been completed in the JKSYUs.

This alternative carries the assumption that the 70,360 acres removed from the base through timber production capability classification (TPCC) in the development of the proposal will not satisfactorily regenerate commercial timber when the existing timber is removed. Further, it is assumed that timber harvest activities would take place uniformly over the JKSYUs with equal emphasis on all commercial forest lands in the old base, including those which would not regenerate.

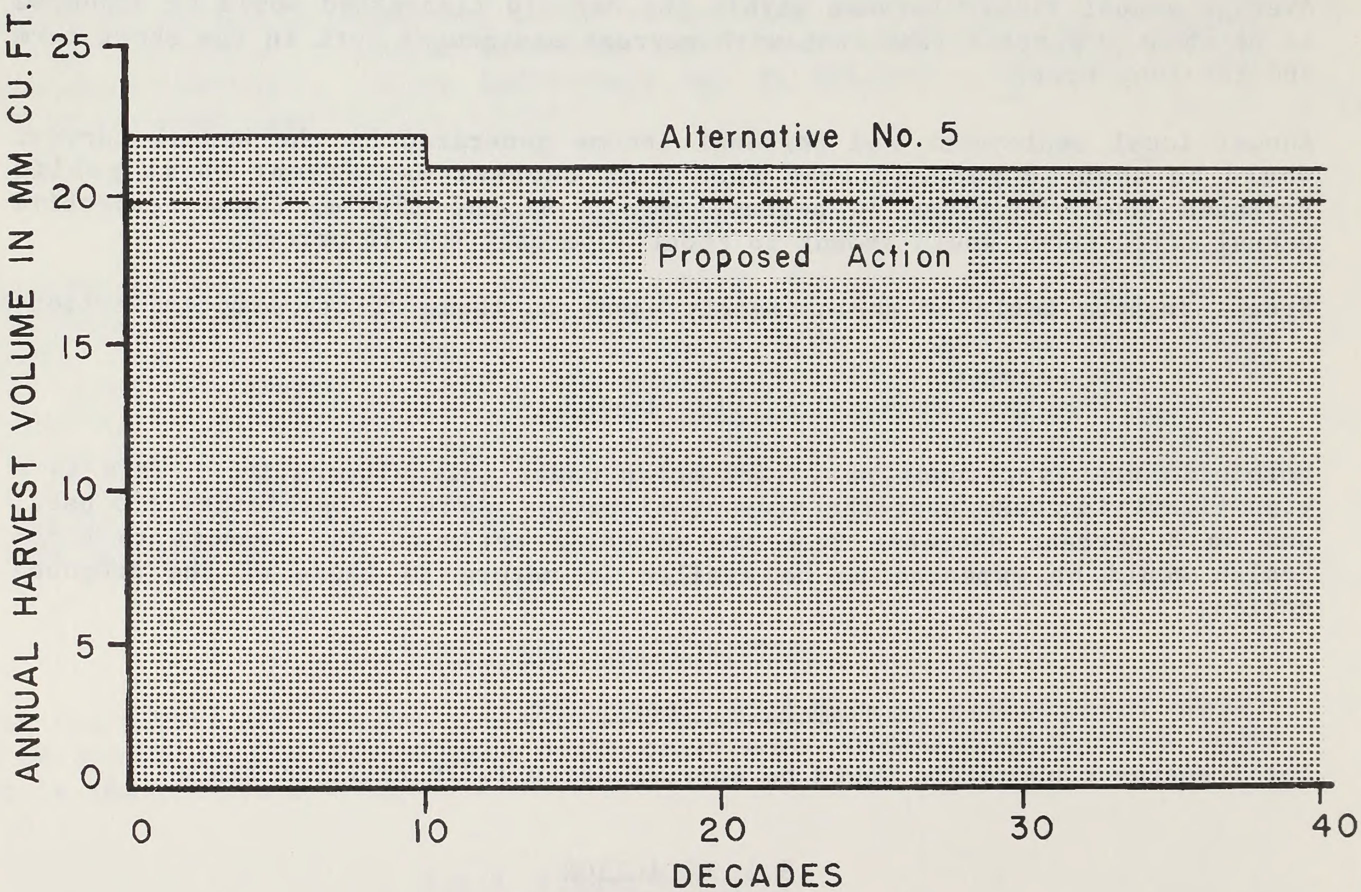


Figure 8-6 Comparison of Proposed Annual Allowable Cut with Annual Allowable Cut Using Alternative No. 5

Source: BLM Forest Inventory, 1976

The forest simulation model, using 1970 management assumptions and commercial forest bases, showed markedly different responses in the two SYUs. In the Klamath SYU the current harvest level of 4.35 MM cu. ft. (25 MM bd. ft.) is less than that called for in the proposed action. Accordingly, it could be maintained indefinitely. By the end of the sixth decade all harvestable timber would be removed from the 6,320 acres identified as incapable of sustained yield timber production.

In the Jackson SYU the current cut level of 17.58 MM. cu. ft. (103 MM bd. ft.) could be maintained for 10 decades before the sustainable harvest level drops to 16.21 MM bd. ft. (95 MM. bd. ft.). At the end of the sixth decade all harvestable timber would have been removed from the 64,040 acres identified as incapable of sustained yield timber production. Pro rata harvest from all acres during that period would place substantially less load on the acreage capable of sustained yield production. The sustained yield base at that time would exhibit a better distribution of age classes and contain a greater volume of standing merchantable timber than would occur under the proposed action. Thus, four additional decades at the 17.58 MM cu. ft. (103 MM bd. ft.) level would be possible.

Primary reforestation emphasis would rely on natural regeneration with planting assumed for approximately one-third of the harvested area. Precommercial thinning, where appropriate, would begin in the second decade. There would be no use of herbicides, mechanical scarification, gopher control or fertilization under this alternative.

8.5.1 Air Quality

Because no burning is proposed, air quality would not be significantly impacted.

8.5.2 Soils

8.5.2.1 Erosion

About 63,415 tons of soil would erode as a result of yarding, disposal and road construction activities. This is 65 percent less than the amount of soil eroded from treated lands in the JKSYUs presently. Site-specific impacts would still be expected on some areas, such as low-fertility sites.

8.5.2.2 Soil Productivity

Compaction would result in a 14.8 percent loss of productivity on 7,440 acres that would not be ripped or otherwise treated to reduce compaction. This would be a significant adverse impact.

8.5.3 Water Resources

8.5.3.1 Water Yield

Increased water yield from the BLM-administered lands would be 5,400 acre-feet per year. This is 50 percent less than increases from present activities and 20 percent more than would occur with the proposed action. Streambank erosion would be reduced and channel stability improved when compared to present conditions, with subsequent improvement in water quality.

Overall yield from major watersheds, however, would not be significantly reduced.

8.5.3.2 Water Quality

Sediment Yield

Sediment yield from yarding, transportation, gross yarding and mechanical scarification activities would impact streams by adding 13,360 tons of sediment to them. This is 53 percent below the present situation, and 11 percent less than the proposed action. This alternative would have significant adverse impacts on water quality in localized areas.

Chemical Quality

An additional 11,655 pounds of nitrogen would be added to streams as a result of clearcutting, shelterwood harvest, and slash burning. This represents an increase of less than 1 percent of that added from the areas prior to these activities, an insignificant amount overall, but may have significant localized impacts.

8.5.4 Vegetation

Continuation of the current level of timber management would result in the following significant impacts to vegetation during the first decade:

(a) Early successional stages would be initiated on approximately 33,300 acres based on clearcut and regeneration cut acres.

(b) Removal of timber in the 70-200 year age classes would occur on approximately 7,580 acres. This constitutes about 6 percent of the existing timber in these age classes on high intensity lands.

(c) Old-growth timber (200+ years) would be removed on about 32,200 acres. This accounts for approximately 33 percent of existing old-growth timber on high intensity lands.

(d) Destruction of surface vegetation due to yarding methods would occur on about 6,100 acres. This could lead to an increase in soil erosion on these acres.

(e) Complete long-term elimination of vegetation would occur on about 1,770 acres based on new road construction with continued maintenance of these roads.

8.5.5 Animals

During the initial decade about 82,000 acres would be subjected to habitat modification through harvest, road building and thinning practices. In most cases, the modifications would be great enough to change the animal composition and density on those acres.

Clearcutting and shelterwood regeneration harvest would cause about a 203 percent increase in early successional stage vegetation. This would be beneficial to those species adapted to exist in this type of habitat (see Table 2-6), and potentially could result in a 203 percent increase in animals that use this habitat.

About 33 percent of the old growth currently existing on the high intensity lands of the JKSYUs would be harvested during the first decade. This could mean a 33 percent reduction in old-growth dependent species such as the northern spotted owl, northern flying squirrel and Vaux's swift on those lands. Old growth would be eliminated on the high intensity lands of the JKSYUs by the year 2018 if this alternative were implemented.

Worst case analysis discloses a total of 13,360 tons of sediment (see Section 8.5.3.2) could be deposited on the streams of the JKSYUs. This could be detrimental to an individual stream and its fishery resources but it would be insignificant to the JKSYUs as a whole.

No adverse impacts are expected to occur to any Federally-listed threatened or endangered species. This Siskiyou Mountain salamander and the river otter (which are currently undergoing status review) and the northern spotted owl (a species the State of Oregon considers threatened) could have their habitat reduced and/or degraded. While individuals may be affected, the species are not expected to be adversely impacted (see 3.6.4).

8.5.6 Recreation

Continuing the current level of timber harvest in the JKSYUs would result in a number of adverse impacts for recreationists. Significant degradation of the recreational experience and limitation of quality recreational opportunities would result. Hunting, camping and ORV use would probably increase slightly; general sightseeing, fishing and miscellaneous use would decrease.

The destruction of small, undeveloped pristine areas would be noticeable. Approximately 34,148 acres of land proposed for timber harvest would be in undisturbed areas.

8.5.7 Cultural Resources

The chance of unidentified cultural sites being inadvertently damaged or destroyed would occur under this alternative. Impacts would be the same type as those of the proposed action.

8.5.8 Visual Resources

Maintaining the current level of allowable timber harvest on the JKSYUs during the first nine decades would result in impacts similar to the proposed action.

8.5.9 Wilderness

O&C lands suitable for sustained yield timber management with possible wilderness or primitive values would be harvested. Impacts are essentially the same as those of the proposed action.

8.5.10 Noise

The impacts of noise intrusiveness would be significant during the first nine decades.

8.5.11 Ecologically Significant Areas

Impacts are the same as in the proposed action.

8.5.12 Socioeconomic Conditions

The impacts of this alternative would be the same as a continuation of existing management as described in Chapter 2.

8.5.13 Health

Possible adverse impacts to human health caused by herbicides would not occur since none would be used under this alternative.

8.5.14 Energy Use

Total energy consumption would be approximately 1.508 trillion Btu's.

Table 8-4

Comparison of Treatments - Existing Situation, Proposed Action, and Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	ALTERNATIVES 1	2	3a	3b	4	5	Remarks/Assumptions
Air Quality										
Particulates	tons/yr	0	635-2,500	485-1,905	575-2,275	850-3,355	715-2,825	580-2,295	0	Based on research data (US EPA 1978)
Carbon Monoxide	tons/yr	0	750-18,750	570-14,220	680-16,965	1,000-25,030	845-21,090	685-17,130	0	
Soils										
Increased Erosion	tons/decade	178,650	64,250	63,540	63,885	65,635	64,870	64,100	63,415	Estimate based on research data
Loss of Soil Productivity due to compaction	acres/decade	14,780	6,700	8,220	6,360	9,500	8,030	6,540	7,440	
Water Resources										
Water Yield	ac-ft/yr	10,650	4,500	3,600	3,650	5,700	5,200	4,150	5,400	Based on methodology used in Table 3-4
Sediment Yield	tons/decade	29,420	15,649	11,750	14,010	19,695	17,220	14,755	13,360	
Increased Nitrogen	pounds/decade	22,140	20,415	16,965	20,245	29,865	25,160	20,440	11,655	
Vegetation										
Initiation of Early Successional Stages	acres/decade	11,000	31,200	23,745	28,330	41,800	35,210	28,600	33,295	Based on clearcut and regeneration cut
Removal of Timber in 70-200 yr. Age Class	acres/decade	N/A	7,100	4,890	6,865	10,110	8,025	6,675	7,575	
Removal of Old-Growth (200+ age class) Timber	acres/decade	N/A	30,205	22,520	29,690	41,175	34,470	26,990	32,230	
Destruction of Surface Vegetation Due to Yarding Methods	acres/decade	N/A	10,630	8,090	9,650	14,245	11,990	9,745	6,060	Includes gross yarding of unmerchantable volume
Complete Elimination of Vegetation	acres/decade	N/A	1,770	1,770	1,770	1,770	1,770	1,770	1,770	Based on new road construction and maintenance
Wildlife Habitat										
Habitat Modified	acres/decade	N/A	89,855	74,350	60,700	111,900	98,195	84,450	82,020	Roads, harvest and thinning
Early Successional Stage Habitat	acres/decade	11,000	31,200	23,745	28,330	41,800	35,210	28,600	33,295	Clearcut and regeneration cut

Table 8-4 (Continued)

Comparison of Treatments - Existing Situation, Proposed Action, and Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	ALTERNATIVES 1	2	3a	3b	4	5	Remarks/Assumptions
Wildlife Habitat (Continued)										
Increase in Early Successional Stage Habitat	percent/decade	N/A	184	116	158	280	220	160	203	Clearcut and regeneration cut
Old Growth (200+) Cut in 1st Decade on High Intensity Lands	acres	N/A	30,205	22,520	29,690	41,175	34,470	26,990	32,230	
Old Growth (200+) Cut in 1st Decade on High Intensity Lands	percent	N/A	31%	23%	30%	42%	35%	27%	33%	
Old Growth Eliminated on High Intensity Lands	year	N/A	2028	2048	2028	2018	2018	2028	2018	
Gopher Control	acres/decade	0	9,000	6,850	0	12,055	8,250	0	0	Poison bait
Socioeconomics										
Timber Supply										
BLM Timber Harvest	MM bd.ft./yr.	128	120	91	109	161	136	110	128	All socioeconomic data representing the existing situation are based on expected 1980 harvest with continued current management. For comparison, the data describing the proposed action and each alternative are also based on expected conditions in 1980. Refer to narrative for discussion of analysis.
Employment (Direct)										
Timber	jobs/yr.	850	810	610	730	1,080	910	730	860	
Forest Development	jobs/yr.	0	50	30	40	70	60	50	0	
Total Local	jobs/yr.	850	860	640	770	1,150	970	780	860	
Total Nonlocal	jobs/yr.	80	80	60	70	100	90	100	80	
Employment (Direct & Indirect)										
Local	jobs/yr.	1,570	1,560	1,180	1,420	2,120	1,790	1,450	1,580	
Non-Local	jobs/yr.	150	140	100	120	180	160	180	150	
Income (Direct)	$1,000,000/yr.	13.2	13.0	9.9	11.8	17.7	14.9	12.1	13.2	
Income (Direct & Indirect)	$1,000,000/yr.	22.9	22.8	17.3	20.7	30.9	26.1	21.2	23.1	
Public Finance										
O&C Counties	$1,000,000/yr.	9.9	9.2	7.0	8.4	12.4	10.5	8.5	9.9	
Tax Rate Equivalence										
O&C Counties	$1/$1,000 TCV/yr.	.28	.26	.20	.24	.35	.30	.24	.28	

Table 8-5
Comparison of Alternatives to Present Situation in Relation to Statewide (LCDC) Goals

	LCDC Goals	Proposed Action	Alternatives 1 No Vegetation Control	2 Limited Investment	3 Surplus Inventory	4 Forestry Program	5 No Action
I	Citizen involvement	+	+	+	+	+	0
II	Land use planning	+	+	+	+	+	0
III	Preserve agriculture lands	0	0	0	0	0	0
IV	Conserve forest lands for forest uses 1/	0	-	0	0	0	0
V	Conserve open space and protect natural and scenic resources	+	+ +	+	-	+	0
VI	Improve air & water quality	+	+ +	+	-	+	0
VII	Protect life and property from natural disasters	0	0	0	0	0	0
VIII	Satisfy recreation needs	0	0	0	0	0	0
IX	Diversify & improve economy 2/	0	-	-	+	0	0
X	Provide for housing needs 2/	-	--	-	+	-	0
XI	Plan and develop public facilities	0	0	0	0	0	0
XII	Provide transportation system	0	0	0	0	0	0
XIII	Conserve energy	+	+ +	+	-	+	0
XIV	Establish urban growth boundaries	0	0	0	0	0	0

- \- slightly less compatible
- -- substantially less compatible
- 0 same
- \+ slightly more compatible
- \+ + substantially more compatible

1/ No value judgment comparison of compatibility with goal IV was considered appropriate; the goal itself does not rank the various forest uses.

2/ In comparing with goals IX and X, the paramount consideration was economic stability and sustained timber supply. Second was the level of the sustainable timber harvest.

CHAPTER 9

Consultation and Coordination

9

9. CONSULTATION AND COORDINATION

From the very beginning of the planning system in the Jackson and Klamath Sustained Yield Units, Medford District sought public input through various means as outlined below. A full record of all public participation is available for review in the Medford District Office.

In development and coordination of the proposal, the Medford District made contact concerning the management framework plan with local groups and officials. Public meetings and workshops were held and field tours conducted. Primary documents utilized in writing this environmental statement were the planning system sections prepared in Medford District which reflect the public participation received.

Public media, government and private agencies, industrial groups and others were the recipients of several information documents dealing with the ES. These included correspondence, news releases and copies of the preparation plan. Oregon media coverage consisted of 2 wire services, 13 newspapers, 10 television stations, and 20 radio stations. Several northern California media outlets with interest in timber were also on the mailing list.

In all, exclusive of the media, some 400 others were kept informed of the progress on the management framework plan, timber management plan and environmental statement for the JKSYUs.

9.1 REVIEW OF DRAFT STATEMENT

Comments on the draft environmental statement have been requested from the following agencies and interest groups:

Federal Agencies

Advisory Council on Historic Preservation*
Department of Agriculture
- Forest Service
- Soil Conservation Service

Department of Commerce
- National Marine Fisheries Service

Department of Defense
- U.S. Army Corps of Engineers

Department of Energy
- Region X*

Interest Groups (partial listing)

Ada County Fish and Game League
American Forest Institute
Associated Oregon Industries
Association of O&C Counties*
California Trout
Cascade Holistic Economic Consultants (CHEC)*
Friends of the Earth
Headwaters Association
Industrial Forestry Association*
Izaak Walton League
Jackson County Stockmens Association

Department of the Interior
- Fish and Wildlife Service*
- Geological Survey*
- Heritage Conservation and Recreation Service*
- National Park Service*
- Bureau of Mines
- Bureau of Reclamation*

Small Business Administration
Environmental Protection Agency*

State and Local Government

Oregon State Clearinghouse*
Oregon Regional Clearinghouses
- Umpqua Region Council of Governments
- Klamath-Lake Planning Council
- Rogue Valley Council of Governments*

Oregon State Historic Preservation Officer*
Boards of County Commissioners
- Jackson County
- Josephine County
- Klamath County

League of Women Voters
Montana Wilderness Association
National Resource Defense Council*
National Wildlife Federation
Northwest Environmental Defense Center
North West Timber Association*
Oregon Cattlemens Association
Oregon Environmental Council
Oregon Natural Heritage Program
Oregon Student Public Interest Research Group
Oregon Wilderness Coalition
Pacific Northwest Four-Wheel Drive Association
Sierra Club*
Southern Oregon Citizens Against Toxic Sprays (SOCATS)*
Southern Oregon Resource Alliance (SORA)*
Southern Oregon Timber Industries Association*
The Wilderness Society
Western Forest Industries Association*
Wildlife Management Institute*

*Agencies and organizations that prepared written responses to the draft statement.

The Notice of Availability of the draft statement published in the June 8, 1979 issue of the Federal Register on page 33149, announced a 45-day public review and comment period. The notice included a schedule of public hearings on the draft statement. Concurrent with publication of the notice of availability, nearly 200 copies of the draft statement were distributed to Federal, State and local government agencies, nongovernment organizations such as conservation groups, and private individuals for their review and comment.

Reading copies were made available for public review at the Bureau of Land Management offices in Portland and Medford, Oregon, and Washington, D.C. Copies were also placed in 4 university and 10 public libraries.

A news release of June 4, 1979, from the Oregon State Office, Bureau of Land Management, announced the availability of the draft statement.

9.2 PUBLIC COMMENTS AND RESPONSES

All letters received and hearing testimony were reviewed and considered. Comments which presented new data, questioned facts and/or analyses, or raised questions or issues bearing directly upon the environmental effects of the proposed action, were used in revising the text or are responded to separately.

Many comments pertained to the proposed action and not the impact analysis. These comments have been responded to in this chapter and will be considered during the decisionmaking process.

Some comments, which were solely editorial in nature, were incorporated in the text of the Final Environmental Statement (FES), but were not responded to in this chapter. All letters of comments received are printed in Section 9.2.2. Responses to these written comments are in Section 9.2.2. Each agency, organization, or person that provided written submissions was assigned an index number in the chronological order in which received. Material enclosed with letters 4, 8 and 23 is available for review at the Oregon State Office.

9.2.1 Public Hearings

The Bureau of Land Management held public hearings in Medford, Oregon, on June 27, 1979, at 1:00 p.m. and 7:00 p.m. Nine people (including members of the news media) attended the meetings. Two people expressed concern about the proposed action, but no testimony was presented on the adequacy of impact analysis.

The hearings were recorded verbatim by a court reporter. Copies of the hearing transcripts are available for public review at the State Director's Office, Bureau of Land Management, 729 N.E. Oregon Street, Portland, Oregon and the Medford District Office, 310 W. Sixth Street, Medford, Oregon.

9.2.2 Response to Written Comments

Letter Number	Agency, Organization, or Individual
1	Cascade Holistic Economic Consultants (CHEC)
2	Geological Survey, USDI
3	Advisory Council on Historic Preservation
4	Bureau of Reclamation, USDI
5	Wildlife Management Institute
6	Heritage Conservation and Recreation Service, USDI
7	Sierra Club, Rogue Group
8	Preserve Our Scenic Environment (POSE)
9	National Park Service, USDI
10	State of Oregon, Forestry Department

Letter Number	Agency, Organization, or Individual
11	Fish and Wildlife Service, USDI
12	Natural Resources Defense Council, Inc.
13	Department of Energy, Region X
14	North West Timber Association
15	Industrial Forestry Association
16	Association of O&C Counties
17	Kogap Manufacturing Company
18	U.S. Environmental Protection Agency, Region X
19	Southern Oregon Resources Alliance
20	Oregon Intergovernmental Relations (A-95 Clearinghouse)
	Division of State Lands
	Department of Fish and Wildlife
	State Historic Preservation Officer
21	Southern Oregon Timber Industries Association
22	Western Forest Industries Association
23	Southern Oregon Citizens Against Toxic Sprays (SOCATS)
24	Southern Oregon Timber Industries Association
25	Southern Oregon Citizens Against Toxic Sprays
26	Preserve Our Scenic Environment (POSE) Committee
27	Rogue Valley Council of Governments

Response to comments in Letter 1

1-1 Refer to changes in the text in Section 2.18.3.

1-2 Trial harvest on low intensity lands would be conducted for specific purposes as discussed in Section 1.2.1.2. Harvested areas would be monitored for vegetation results and much of the FIR research (see Section 1.4.2) would be concentrated on these areas. Since no final harvest cut is scheduled on low intensity lands during the decade (Table 1-1) and the trial harvest program is limited to one decade, it cannot be concluded that the program constitutes "timber mining."

1-3 A comparison of the results of the 1971 inventory and the 1978 inventory must be tempered with the fact that the two inventory designs differ considerably.

The 1970 inventory was based on plot projections of field plots installed systematically on a 1.7 mile grid. The 1978 inventory was based on a stratified sampling design in which TPCC and OI were the prime criteria for identifying and placing each forest stand in the proper stratum. Since the TPCC was an in-place identification of the various land classes (non-forest, non-commercial, etc), the land base described by the 1978 inventory can logically be expected to be more reliable than the systematic plot expansions used in 1970.

1-4 The ratio between the amount of soil eroded from an area and the sediment yield from that area is the sediment delivery ratio. Not all of the soil that is eroded (worn away from the earth's surface by water, wind, ice or gravity) reaches water bodies where it could contribute to the sediment yield. The soil, in most cases, is simply moved from one position on a hillside to another. See Section 3.3.2.3 for text changes.

1-5 Results from Forest Service studies and the Regional Forest Nutrition Research Project conducted by the University of Washington show that response to nitrogen fertilizer in southern Oregon has been excellent (recent unpublished data from U.S. Forest Service and University of Washington). While there was some variation, gross basal area mean growth increased 46 percent in thinned research plots and an average of 41 percent in unthinned stands after application of 200 pounds of nitrogen per acre. Volume increased 35 percent after fertilization on plots in the Umpqua and Siskiyou National Forests.

1-6 Mitigation of impacts identified in Chapter 3 had not been proposed beyond those levels included in the proposal and described in Section 1.3 as project design features. Several comment letters have provided valid and constructive suggestions which BLM has adopted and included in Chapter 4 of this Final Environmental Statement (FES).

1-7 A benefit-cost analysis of timber production on low intensity lands was not included because of the uncertainty regarding regeneration of these areas. The objective of the trial harvest, proposed for the first decade only, is to gather site specific data on regeneration periods and practices. Specifically, the BLM hopes to learn what practices, if any, will establish a new stand within 5 years.

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VA. 22092

OFFICE OF THE DIRECTOR

In Reply Refer To:
EGS-DES-79/29
Mail Stop 760

20 JUN 1979

Memorandum

To: State Director, Bureau of Land Management
Portland, Oregon

Through: Assistant Secretary--Energy and Minerals JUN 22 1979

From: Acting Director, Geological Survey

Subject: Review of draft environmental statement for timber management plan for Jackson and Klamath sustained yield units, southwest Oregon

We have reviewed the draft statement as requested in your letter.

The environmental statement is noteworthy for treatment of soils (e.g., app. F), problems of erosion and instability (e.g., p. 3-6, 3-7), and for a high degree of internal consistency and clarity in spite of highly quantitative and detailed data.

We recommend addition of a detailed planning map of a sample area and the inclusion of requirements for protection of water quality.

These concerns are discussed in the enclosure.

J. R. [illegible]
Acting Director

Enclosure

ONE HUNDRED YEARS OF EARTH SCIENCE IN THE PUBLIC SERVICE

CHEC
Cascade Holistic Economic Consultants
1604 N.E. 48th, Portland, Oregon 97213 (503) 287-8333

Forestry in the Public Interest

send reply to: PO Box 3479
Eugene, 97403

25 June 1979

Oregon State Director (911.1)
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Sir:

Please consider this letter written testimony for the public hearing on the Jackson-Klamath Sustained Yield Units draft timber management environmental impact statement. Many of my comments for the Josephine EIS are valid in this case as well, and will be incorporated by reference.

1-1 First, it should be noted that there are several points where the EIS fails as an objective account of the proposed action. The most blatant example of this is found on page 2-71, where local landowners who are concerned about herbicide and other impacts on water quality are labelled "recreationists and preservationists." This emotional language is inappropriate and uncalled for.

1-2 Second, I must emphasize the concern expressed in CHEC's comments on the Josephine that the proposed management of the "low intensity" lands will be little more than timber mining. As will be described later, it is very unlikely that these lands will be capable of producing an economic return. It seems all too likely that, after the first cut of old growth is made, the BLM will come to this conclusion and abandon the management of these lands. If this is a possibility, the EIS must say so.

1-3 This seems particularly important in light of the inventory differences expressed on pages 1-48 to 1-51. The 1978 inventory shows more non-forest lands than the 1970 inventory -- not surprising, as the inventory standards have become more stringent. Yet the 1978 inventory shows less non-commercial forest lands than the 1970 -- so much less that the total non-forest and non-CFL in 1978 is 21,360 acres less than in 1970 for the Jackson SYU alone.

Where did these acres of non-CFL go? If this isn't just a result of statistical error the land must now be classified low intensity and limited management. It seems likely that the Bureau is planning to harvest timber from land once considered non-commercial. If this difference in inventory is just a matter of statistical error it reaffirms the questions I've repeatedly asked about the validity of the BLM inventory process.

1-4 The environmental impact section leaves much to be desired. It says that road activities will cause erosion of over 60,000 tons of soil. Fortunately, total sediment yield from road construction as well as all other logging activities amounts to only about 15,000 tons. Whether the rest vanishes

into thin air or disappears into some space-time warp a la Star Trek is not made clear. It appears that the writer of the soil impact section was not consulted by the writer of the water quality impact section.

1-5 Once again this EIS fails to make any note of the reservations expressed by scientists consulted by the Bureau regarding fertilization of Southwest Oregon forests. Nearly all fertilization research has been conducted in Douglas County Northword, on soils known to have nitrogen as the first limiting factor to productivity. In Southwest Oregon moisture is generally the first limiting factor. At least one scientist consulted by the Bureau stated that fertilization would tend to be counter-productive, as it would cause an increase in soil moisture stress. Like the Josephine, the Jackson-Klamath EIS clings without justification to its pie-in-the-sky faith in untested and risky practices.

1-6 Section 4, "Mitigation Measures Not Included in the Proposed Action," adds a touch of humor to an otherwise dreary report by claiming that no technologically feasible mitigation measure is not included in the proposed action. Could not the 15,000 tons or 64,000 tons of soil eroded, whichever it happens to be, be partially saved if fewer miles of road were constructed and more timber logged with skyline yarders capable of reaching nearing a mile from the landing? Could not herbicide applications be reduced by using three-stage shelterwoods or selection cutting? Could not the adverse impacts to pocket gophers identified on page 5-3 be mitigated if you didn't poison them? The possibilities are endless. To state that no additional mitigation measures are possible is absurd. It is important that these and other mitigation measures be examined so that the decision-maker as well as other reviewers have the facts with which to decide just what action is most appropriate.

1-7 The major failing of this EIS in my eyes results from the BLM's decision to leave economic analyses of proposed and alternative actions out of an EIS. Such an analysis could show whether the present value of the benefits of reforestation of low site lands exceed the present value of the costs. Even at such low discount rates as 5%, it is unlikely that the low intensity management lands would be economically suited for timber harvesting. These lands probably take 100 years to reach harvesting age, which means a $200 per acre investment in reforestation must be worth over $26,000 per acre at maturity. Does any of your low site timber net this much today?

The U.S. taxpayer has a right to know if he or she is expected to subsidize future timber harvests. The BLM has a responsibility to Congress and to the public to manage on a sustained yield. If this will require an eventual subsidy we should know now so we may decide whether we want the future to pay for our extravagance or whether we will be responsible today. The JKSYU TM EIS fails to give the information necessary to make such a decision.

Yours truly,

Randal O'Toole

Randal O'Toole
Staff Forester

It is stated that appendix A "illustrates the timber sale plans which would be implemented under the proposed action" (p. A-1), covering the period FY 1980-1982. However, the only map provided to accompany that plan is figure A-1, which shows the location of all timber sales only in a generalized way by means of a circular symbol. We suggest that it would be helpful to include also at least one typical map of a proposed sale area at the scale that would be used for planning purposes, illustrating the typical degree of detail to be used in planning of new road alignments and logging methods in conjunction with soil associations in order to avoid adverse soils and geologic conditions.

2-1 We suggest the inclusion of either standards or guidelines for concentrations in water of herbicides that are to be used. For example, we note that the U.S. Environmental Protection Agency's recommended limit for 2, 4-D in water is 0.02 mg/l or one-fifth the observed levels mentioned on page 3-13 (U.S. Environmental Protection Agency, 1972, Water quality criteria, p. 79).

The draft statement indicates authorized and unauthorized use of water on BLM lands and indicates that the number of applications for water use 2-2 is increasing as the population grows (p. 2-55). The draft statement should indicate whether ground water is used or sought by the applicants and, if so, what steps are taken in issuing permits to ensure preservation of the quality of ground water. Information concerning any appropriate requirements for sanitary system discharges on BLM lands might be included. If water supplies and sanitary facilities are to be provided for any recreational areas, the statement should include at least general plans or policies concerning the maintenance of the quality of drinking water in such areas.

Response to comments in Letter 2

2-1 See text changes in Section 3.4.2.2.

2-2 The State of Oregon reviews applications for ground water use, and is also the regulatory agency for safety of drinking water. BLM issues the easement for the conveyance of the water across public land once the diversion is approved by the Stste Engineer. To date, diversions for household use have been from springs.

Advisory Council On Historic Preservation

3

1522 K Street N.W.
Washington D.C.
20005

Reply to: P. O. Box 25085
Denver, Colorado 80225

June 22, 1979

Mr. Murl W. Storms
State Director
Bureau of Land Management
729 N.E. Oregon Street
P. O. Box 2965
Portland, Oregon 97208

Dear Mr. Storms:

This is in response to your request for comments on the draft environmental statement (DES) for the proposed Jackson and Klamath Sustained Yield Units Ten-Year Timber Management Plan, Medford District, Oregon.

3-1 Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Council has determined that this DES does not demonstrate compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320). However, it appears that the Bureau of Land Management understands its responsibilities and will carry them out in the future as appropriate.

Should you have any questions, please contact Brit Allan Storey of the Council's Denver staff at P. O. Box 25085, Denver, Colorado 80225, or at (303) 234-4946, an FTS number.

Sincerely,

Louis S. Wall
Chief, Western Office
of Review and Compliance

Response to comments in Letter 3

3-1 Because sites remain to be discovered, compliance with Section 106 of the National Historic Preservation Act of 1966 can only occur when these unknown sites are located.

United States Department of the Interior

BUREAU OF RECLAMATION
PACIFIC NORTHWEST REGION
FEDERAL BUILDING & U.S. COURTHOUSE
BOX 043-550 WEST FORT STREET
BOISE, IDAHO 83724

IN REPLY REFER TO: 150

JUN 29 1979

Memorandum

To: State Director, Bureau of Land Management
Portland, Oregon

From: ACTING Regional Director, Boise, Idaho

Subject: Draft Environmental Statement for Jackson and Klamath Sustained Yield Units, Ten-Year Timber Management Plan (DES 79/29)

The subject document has been reviewed by appropriate members of our staff. The comments below are provided for your use in preparing the final version of the environmental statement.

4-1 The Jackson and Klamath Sustained Yield Units include the area in which the Howard Prairie delivery canal and related facilities are located. An analysis should be made of possible road crossings or other actions which might impact these irrigation facilities. The impact and mitigative actions, as appropriate, should be cited in the final document.

The Bureau of Reclamation's study (1969-1974) of potential water development on Evans Creek considered a dam and reservoir at the Hull Mountain site. A copy of the Concluding Report on the Evans Valley Division is enclosed for your reference.

Please let us know if we can be of additional assistance.

H. R. Stivers

Enclosure

cc: Commissioner, Attention Code 150 WDC (w/o enclosure)
Director, Office of Environmental Project Review, WDC (w/o enclosure)

Response to comments in Letter 4

4-1 Standard procedure provides for coordination with an irrigation district when projects are undertaken which may affect their facilities. Coordination occurs when site specific planning is in progress.

9-10

Wildlife Management Institute

709 Wire Building, 1000 Vermont Ave., N.W., Washington, D.C. 20005 • 202/347-1774

July 6, 1979

Oregon State Director (911.1)
Bureau of Land Management
Post Office Box 2965
Portland, Oregon 97208

Dear Sir:

The Wildlife Management Institute is pleased to comment on DRAFT TIMBER MANAGEMENT ENVIRONMENTAL STATEMENT, JACKSON-KLAMATH, Oregon.

The environmental effects of the proposed timber management plan are well stated and analyzed.

We urge that O and C lands be included under the Federal Land Policy and Management Act. To specify management for only timber and recreation is not acceptable in this day and age. This management can be particularly detrimental to wildlife by severe elimination of ecosystem or age diversity.

The plan is not acceptable for wildlife. Major changes will be needed to make it acceptable.

5-1 Fisheries production and its relation to silt must be quantified. Recent Forest Service Land Plans in the Douglas Fir region have done so. Goals should be nondegradation of habitat and populations (3-35).

5-2 There is no firm commitment to snag retention. Page 3-29 refers to a "proposed" management decision. Page 5-3 refers to a MFP "Recommendation." Minimum standards must be prescribed and followed. Forage logs can be left in areas where gross yarding is practiced (p. 3-32).

Riparian protection requires more than a 100-foot buffer strip on each side of Class I streams. Both Fishery and Wildlife recommend 200 feet on each side. Riparian management is a vital, emerging conservation issue; more recognition must be given to this prime wildlife habitat (p. 1-15).

We appreciate retention of habitat for 8 pairs of spotted owls. A good old growth retention plan could provide habitat for more than this bare minimum. 5-3 Likewise, the undisturbed areas around raptore nests are good (p. 1-16). What becomes of this old growth habitat the first year a nest is unoccupied?

5-4 Proper habitat diversity calls for following wildlife recommendations of 320 acres of old growth per five sections. This was rejected. The 94,000 acres

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5-4 in Table 1-8 will not suffice to meet old growth needs because 43,000 acres are in low intensity management lands and 44,000 acres are in limited forest management lands (p. 1-25). By definition (p. 1-19 and G-5), these lands have problems of slope, site, soils and regeneration. To call the poorest lands, with limited suitability for timber production, wildlife lands is no longer acceptable. Wildlife, like trees, are a product of the soil and need the same soils as trees.

We appreciate that only 30 percent of the old growth will be removed the first 10 years. Our concern is the 40-year projection for nearly complete removal of old growth, with only 19 acres left on high-intensity lands at that time (p. 3-42).

5-5 There is no mention of coordination with the Oregon Fish and Wildlife Commission or a memorandum of understanding with them in the coordination with State government (p. 1-45).

5-6 Nowhere could we find a discussion of the effects of harrassment on wildlife. Roads and repeated, regular silvicultural entries may have pronounced effects on wildlife use and reproduction.

These remarks have been coordinated with William B. Morse, the Institute's Western Representative.

Sincerely,

Daniel A. Poole

Daniel A. Poole
President

DAP:lbb

Response to comments in Letter 5

5-1 Section 3.6.3 Fish has been re-written. Based on available data and the non-site specific nature of the proposal, quantification is not possible. Where specifics exist, this information has been used.

5-2 Oregon law requires that all snags over 15 feet high and 12 inches in diameter, within the logging area, be felled. Snags would not be removed from those lands identified in Table 1-8. Forage logs would be left in areas where gross yarding is planned (Section 4.1). In addition, snags and culls would be retained on the boundaries of clearcut units. In shelterwood and single tree selection areas, snags and culls would be retained throughout, unless they conflict with State safety requirements.

5-3 The old growth would probably be harvested in subsequent sales. Such sales, however, would not occur immediately due to the timber sale planning time lag, so that early reoccupancy of the set-aside block by another pair of owls would preserve the habitat.

5-4 The text in Section 3.6.2.1 and Section 3.6.5 has been changed to reflect this.

5-5 A statement has been added to Section 1.5.2.1.

5-6 Section 3.6.2.3 has been changed.

5

UNITED STATES
DEPARTMENT OF THE INTERIOR
HERITAGE CONSERVATION AND RECREATION SERVICE

NORTHWEST REGION
915 SECOND AVENUE, RM. 990
SEATTLE, WASHINGTON 98174

(206) 442-4706

ER-7
100

JUL 6 1979

To: Oregon State Director, Bureau of Land Management

From: Regional Director, Northwest Region

Subject: Review of draft environmental statement for Ten-Year Timber Management Plan, Jackson and Klamath Sustained Yield Units, Jackson and Klamath Counties, Oregon

We have reviewed the subject DES as requested in your transmittal letter, and offer the following comments for your consideration when preparing the final environmental statement.

6-1 The DES covers a very large area (488,258 acres of BLM land). We feel site specific information is inadequate on proposed timber management and harvest activities, related road construction, and the probable impacts of these on both developed and undeveloped recreation areas. We feel public agencies and citizens should have the opportunity to review and comment on specific details of environmental impacts through the NEPA process.

We realize the timber management plan is intended to be broad and programmatic in nature. However, we are concerned about the lack of provision for disclosure of detailed information in future environmental statements. To comply with the NEPA requirement for a detailed statement of the environmental impact of a proposed action, the specific nature and extent of probable impacts should be presented in the final statement unless there is assurance these concerns will be treated in future environmental statements.

The DES provides a thorough description of known cultural resources and provides for surveys in advance of ground disturbing activities. The
6-2 final statement should reflect intended compliance with 36 CFR 800 as amended (Federal Register, January 30, 1979) in regard to required consultation with the State Historic Preservation Officer (SHPO). These requirements include consultation on: the need for and type of survey(s) to identify eligible historic and archeologic properties, survey boundaries, application of National Register criteria to identified properties,

determination of effect of the proposal on National Register or eligible properties, and other 36 CFR 800.4 procedures if such properties will be effected. The FES should contain a letter from the SHPO reflecting consultation as required.

Pursuant to authority contained in the Act of August 21, 1935 (49 Stat. 666; 16 USC 461), the Department of the Interior administers and implements a natural areas program, including the National Registry of Natural Landmarks. We have identified three potential landmarks located in or near the DES area, all in Jackson County: Lower Table Rock, Agate Desert, and Ashland Research Natural Area. The final environmental
6-3 statement should describe these areas and expected impacts if located within the DES area or near enough to be impacted by proposed management activities. We suggest you contact Gordon Atkins of this office (FTS: 399-4720) for details.

Thank you for the opportunity to review the subject DES.

for A. Kling Mallon

Maurice H. Lundy
Regional Director

Response to comments in Letter 6

6-1 Section 1.5.3 specifies requirements for future environmental assessment. Public agencies and citizens have the opportunity to review and comment on further environmental assessment.

6-2 Consultation with the State Historic Preservation Office (SHPO) as required by 36 CFR Part 800 has been an on-going process throughout the EIS process. Letter No. 20 from the SHPO reflects consultation as required and SHPO concurrence that environmental impact is adequately described.

6-3 The Ashland Research Natural Area, administered by the U.S. Forest Service, is outside of the ES boundary and would not be impacted by this proposed action. Impacts to Lower Table Rock and Agate Desert are discussed in Section 3.13.3.

7

2260 Jasmine
July 10, 1979

Oregon State Director (911.1)
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Sir;

Please find enclosed the Rogue Group Sierra Club comments on the Draft Environmental Statement for the Jackson-Klamath Timber Management Plan. We hope these comments and suggestions will be helpful in your completion of this planning program.

Sincerely,

Bill Meyer

Bill Meyer, Conservation Committee
Rogue Group Sierra Club

C.C. Medford District B.L.M.

COMMENTS BY THE ROGUE GROUP SIERRA CLUB ON THE DRAFT ENVIRONMENTAL STATEMENT FOR THE JACKSON-KLAMATH TIMBER MANAGEMENT PLAN

The Rogue Group Sierra Club supports the proposed actions as outlined in the draft environmental statement for the Jackson-Klamath Timber Management Plan. We hope the following comments will be helpful in your planning process.

We support the proposed action because it is based on more accurate information, utilizing new timber inventory data. The proposed program removes the unatainable assumptions that trees would be growing as soon as the final harvest was completed, and that genetically improved trees would be available which would increase the allowable cut. These two assumptions in the previous program, artificially inflated the allowable cut. The new program recognizes the potential of lands to sustain intensive forest management practices, and the abilities of the lands to regenerate trees. It removes from the land base, those lands that are not capable of producing commercial timber and not able to regenerate trees, and allocates these lands for other multiple uses which have greater values for other than timber production. The proposed plan would prevent serious long range economic disaster when the timber would run out because of harvesting on an inflated timber base. The plan calls for intensive timber management practices on those lands best suited for the investement, and recognizes that it is a poor investment to intensively management marginal lands. This allows the utilization of low-productivity lands for other, better suited uses, instead of managing all of the lands for one use, -commercial timber production. The Sierra Club has been advocating this approach for years. The proposed plan calls for the protection of other conflicting resource values such as wildlife habitat, watershed protection, recreation, fisheries, and historic sites which may lower the possible allowable cut, but will maintain the desirability and livability of our southwestern Oregon lands. The plan would provide for the application of new intensive forest practices not previously applied to these lands.

The Sierra Club opposes the continuation of the current practices and harvest level because it would lead to economic disaster in the long run due to overcutting. We would run out of timber in the future because we are now cutting against an inflated timber base. The current program and harvest level would be an environmental disaster as well. If the current plan were to continue, every tree, reguardless of its cost to harvest, or the other resources that were destroyed, is programmed to be harvested. This would result in the timber mining of 70,360 acres where trees would not likely grow back again. It would liquidate the old-growth timber within 30 years, and totally destroy the wildlife habitat for old-growth dependent species. It would decrease the livability and desirability of our area because of the total commitment of the current program to timber harvest to every piece of land irregardless of greater resource values of conflicting uses such as recreation, wildlife habitat, watershed, and historic sites. The current program does not include the application of new intensive forest management practices such as thinning, fertilization, ect. proposed for commercial timber lands in the proposed action. The current allowable cut is inflated, as stated above, because the present allowable cut was calculated on the assumptions that trees would be growing as soon as the shelterwood logging cycle was completed, and that genetically superior planting stock would be available to improve productivity. Experience has shown that there is a considerable lag before reproduction begins and in many cases, hand planting is necessary to fully stock shelterwood cuts. Also, the genetically superior trees have not been available, and therefore, this hoped for increase in

timber volume has not been realized. We have been cutting against these assumed gains, although these gains in productivity have not been made, and are not likely to be so in the future, so the allowable cut should be reduced accordingly. The proposed plan makes these needed changes.

The Sierra Club has serious reservations about the utilization of herbicides as a forest practice, and regrets that the proposed program and allowable cut is based on this questionable forest practice. We urge that alternative means for vegetation management be used where ever possible, even if it may be more costly. This can be justified because it will minimize the exposure of our environment to chemical and genetic damage with its unknown impacts. It would also increase the labor intensive jobs available in the timber industry. With the reduction of timber size, increased mechanization and resultant simplifying of timber harvest under intensive forest management, labor intensive jobs will decrease significantly. Here is one area where new jobs can be created and reduce environmental risks.

We urge that the trial managemant program for low intensity lands in the proposed plan would be made away from roadless areas or existing or potential recreation and wildlife areas in order to minimize conflicts of competing uses of these low intensity lands. This is important because these low intensity lands are where the other uses such as wildlife habitat, old growth timber, and recreation have been allocated in order to fully utilize the available commercial timber lands elsewhere.

The proposed action and its allowable cut is based on some assumptions, which may, like the previous calculations, never be realized. The proposed allowable cut may in fact be unatainable and require a decrease in the cut in the future. These assumptions include the proposed increased timber production from the use of fertilizers and the use of herbicides for vegetation control. Recent studies in the coast range have raised serious questions about the long range effects of herbicides and productivity. The short term effects of herbicides are obvious and visible, but little has been done to prove the long term increase in productivity assumed from this forest practice. They may just be borrowing from Peter to pay Paul. The Sierra Club urges that other, less enviornmentally destructive means be employed to accomplish the same vegetation control objectives. The second assumption on which the proposed action and its allowable cut is based is that the availability and cost-effectiveness of fertilizers will remain economically feasable.
7-1 With the current energy crisis, with little hope of improvement, we question if higher priorities won't preempt this intensive forest management practice. If these two assumptions are not realized, we may find ourselves again cutting more timber than the land base can produce.

The proposed plan, with its resultant reduction in the allowable cut of 21%, predicts a reduction in jobs in the timber industry in the future if the plan is addopted. The Sierra Club feels that these jobs either now or in the future, are jobs that sooner or later would be lost, along with thousands more when we ran out of timber. You can only overcut timber for so long, before everyone looses their jobs. The proposed plan readjusts the previous calculations, and is healthy in the long run for our community. The proposed plan will protect existing and future jobs in conflicting industries such as wildlife management, fisheries and recreation. In many cases these non-timber industry jobs will increase to offset the losses of jobs because this plan proposes the maintenance of our desirable land base and other resource values other than commercial timber.

With these comments and reservations, the Sierra Club supports the proposed action and recognizes that it is a step in the right direction to rectify serious

faults in the previous programed allowable cut, which was causing a serious overcutting of our public BLM lands. We also support the intent of the proposed action to manage all the resources, including timber, to minimize conflicts and maximize where possible, other resource values besides timber harvest. This approach is a tremendous improvement over the total commitment to timber harvest of previous programs. We also strongly support the removal of non-productive lands from the allowable cut timber base. This one action will do more than anything else to preserve our wildlife, recreation, watershed, wildlands, and the livability of southwestern Oregon. This proposed plan will also insure that our economy is on a sounder footing, not cutting against timber which isn't there, or costs more than it is worth. We hope these comments will be helpfull.

Sincerely,

Bill Meyer

Bill Meyer, Conservation Committee
Rogue Group Sierra Club

Response to comments in Letter 7

7-1 The purpose of the Environmental Impact Statement is to assess the impacts of a proposed action and alternatives and thus provide the decisionmaker with an array of resource management options. This impact assessment is based on the most current information available. However, a reordering of future energy priorities that preempts the use of fertilizers for forest development would be a political/economic decision which may need consideration in the future. For now, Alternatives Nos. 1, 2, 4 and 5 offer impact assessments of options that use less fertilizer.

8

5288 Little Applegate Road
Jacksonville, Ore. 97530

July 13, 1979

Oregon State Director
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

Dear Sir:

I would like to comment on an issue which should have been included in the Draft Environmental Statement.

A decision was made last year by the B.L.M. to log in the Little Applegate valley, and this sale (known as the Grouse Creek Timber sale) met with strong opposition from residents, visitors and many people familiar with the area. Two public meetings were held and concerns and protests were voiced. In a six week period prior to the second meeting almost 400 people signed a petition requesting that the areas visible from the Little Applegate highway be removed from the sale.

The Bureau of Land Management has chosen to ignore the importance of the Little Applegate valley as an important recreational area. Yet visitors already travel through the valley to reach two recreation sites - Little Applegate and Kenney Meadows, and the proposed development of the Sterling Ditch will attract even more. Any logging in this valley, which would be visible from the highway would destroy the scenic value of the area to the recreationists who use these facilities.

8-1 The Bureau of Land Management must consider it's relationship to, and responsibilities toward "local" recreational needs in the Environmental Statement. The Little Applegate valley will be severely impacted by the Grouse Creek timber sale and is therefore, entitled to full consideration in the Environmental Statement.

Yours truly,

for P.O.S.E.
(Preserve Our Scenic Environment)

Enclosures:

Response to comments in Letter 8

8-1 The Grouse Creek Timber sale was auctioned in fiscal year 1979. It is therefore not included within the scope of the ES. The impacts of the proposed action to recreation are discussed in Section 3.7.

United States Department of the Interior

NATIONAL PARK SERVICE

Pacific Northwest Region
Fourth and Pike Building
Seattle, Washington 98101

IN REPLY REFER TO:

L7619(PNR)PCC

July 13, 1979

9

Mr. Murl Storms
State Director
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Mr. Storms:

We have reviewed the draft environmental impact statement for Jackson-Klamath Sustained Yield Units Ten Year Timber Management Plan (DES 79-29) and have the following comments.

9-1 The Air Quality section of the Description of the Environment should include reference to the fact that Crater Lake National Park, approximately 15 miles northeast of the subject area, has been designated a Class I area by the Clean Air Act Amendments of 1977.

Thank you for the opportunity to review this statement.

Sincerely yours,

Glenn D. Gallison
Associate Regional Director,
Planning and Resource Preservation

Response to comments in Letter 9

9-1 See text changes in Sections 2.2 and 3.2.

10

Forestry Department

OFFICE OF STATE FORESTER

2600 STATE STREET, SALEM, OREGON 97310 PHONE 378-2560

June 29, 1979

Mr. Murl Storms
Oregon State Director
Bureau of Land Management
P.O. Box 2965
Portland, OR 97208

Dear Murl:

We wish to thank you for the opportunity to review and comment on BLM's Draft Timber Management Environmental Statement for Jackson-Klamath.

We have submitted on the attached papers our support for your 3b alternative plan with some suggested modifications.

Very truly,

Ed Schroeder

Ed Schroeder
State Forester

JES:BB:mo
cc: National Congressman
State Natural Resources Legislative Committee Chairman
USFS Region 6
Governor's office
DED
PLCD
State Clearinghouse (7905 4 1330)
Klamath County
Jackson County
Board of Forestry
Forestry Dept Exec. Staff
Mailing List "Other Organizations and Individuals

O.S.D.F.
7/5/79

O.S.D.F. Response to BLM Draft Timber Management
Environmental Statement for Jackson-Klamath

BLM should be commended for offsetting a diminishing timber supply base by intensifing management.

However, your proposed 8 mmbf. annual cut reduction comes as Oregon approaches a timber harvest decline. President Carter recently requested an increased timber harvest from federal lands to assist in reducing the inflationary costs associated with home building. Your proposed 8 mmbf. annual cut reduction could be ameliorated by modifying some of your land use decisions.

It is unfortunate that regeneration problems or fragile soils have greatly reduced sustained yield timber cutting on 47,840 acres and excluded from cutting another 44,260 acres. These fragile areas should be protected, but also re-evaluated periodically so unnecessary set-asides do not aggravate the diminishing land base problem.

The proposed decisions on the Multiple Use Issues adversely impact the annual timber harvest by 3.174 mmbf. This figure could be increased by .671 mmbf. if the special botanical areas are all withdrawn from the timber production bases.

O.S.D.F. recommends that of the stated alternatives BLM should consider implementing a modified alternative 3b. The main feature of this alternative, as compared to the proposed plan,is the planned two decadal accelerated cutting in the "surplus growing stock". This would increase the annual cut to 136 mmbf., an increase from the current annual cut of 128 mmbf. After two decades, the annual cut would level off to about 115 mmbf. (if no modifications are made).

Accelerated harvesting of this timber would hasten the achievement of a regulated forest. It would remove timber that has passed its period of peak growth and no longer contributes to the growing base. Replacing old-growth stands with vigorous young-growth stands would increase total annual growth and lead to an increase in annual harvest.

10-1 The major modification we recommend to alternative 3b is the addition of the one decade trial harvest program on your low intensity lands. This would add another 5 mmbf. annually and could lead to a permanent regulated harvest program on these lands.

We basically agree with your proposed decision on stream buffers. We do suggest, however, that you modify the 100 foot "no cut zone" to allow selected individual marking for tree harvest by professional foresters. We must recognize that a forest is a living entity and cannot be expected to remain unchanged forever. This recommendation applies to timber harvests adjacent to class 1 and important class 2 streams.

We agree with your proposed decision on sites having special botanical values. We would suggest that a short time frame be assigned to this project. We would like to see the lands without special values released to multiple use benefits, including timber production.

We disagree with your proposed decision on management of VRM Class II Lands. Your proposed decision would reduce the annual harvest by 1.2 mmbf. These zones appear much wider than necessary. Some harvest modification may be needed along main traveled roads. However, little modification should be needed beyond 300 feet from these roads using the single tree or shelterwood systems you have mentioned.

We disagree with your proposed decision on potential recreation sites. You have identified 53 sites, of which 35 are on high intensity timber management lands. These high intensity lands account for 2,200 acres and supply 1.6 mm bf. annually. This, in turn provides an estimated 19 jobs in an already declining industry. We suggest that the majority of these 35 sites not be designated for recreation. Recreational opportunities should be concentrated on other than high intensity timber management lands, where possible.

10-2 We support your decisions to use herbicides and slash burning in your management plans. However, because air quality is a problem in the Rogue Valley, we question whether this issue and all possible aternatives have been adequately considered in your Draft Environmental Statement. Further consideration of non-burning alternatives should be made.

Your proposed management plan, and alternatives 3a and 3b are each comparable to the Forestry Program for Oregon alternative. It is a pleasure to see intensive management practices proposed for BLM lands.

Response to comments in Letter 10

10-1 As indicated in the description of Alternative 3b in Section 8.3, "The additional 0.86 MM cu. ft. (5 MM bd. ft.) harvested on low intensity lands would bring the total planned harvest for the first decade of this option to 23.19 MM cu. ft. (136 MM bd. ft.)".

10-2 Section 3.2 Impacts to Air Quality in the FES has been revised to reflect new information received since the draft was published. To reduce the amount of slash to be burned, relog sales and simultaneous use contracts are being considered by the District.

11

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
Portland Field Office
727 N.E. 24th Avenue
Portland, Oregon 97232

Reference: ES

July 12, 1979

MEMORANDUM

To : State Director, Bureau of Land Management, Portland, Oregon

From : Field Supervisor, Fish and Wildlife Service, Portland, Oregon

Subject: Review of Draft Jackson-Klamath Timber Management Environmental Statement (Your Reference: 1792 JK)

The statement covers the resources and environmental setting of the proposed timber management area fairly well and also describes the possible impacts to fish and wildlife resources resulting from program implementation. The specific comments below address sections which we feel need clarification.

Specific Comments

11-1 Page 3-7, Section 3.3.1.2 YARDING, par. 2. This section should describe the "project design features" used to minimize the occurrences of landslides and slumps caused by timber removal on highly unstable soil areas. Methods such as skyline logging, minimal road construction in these areas, and selective cutting should be discussed in detail.

11-2 Page 3-2, par. 1. Methods of rehabilitation or revegetation of abandoned roads should be discussed.

11-3 Page 3-30, par. 6. For comparison, the section should give some indication of how the proposed clearcut of elk winter range compares with the total acreage of winter range.

Roger E. Vorderstrasse
for John W. Kincheloe

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

Response to comments in Letter 11

11-1 See changes made in Section 3.3.1.2.

11-2 Abandoned roads are normally closed off, waterbarred, scarified and revegetated or replanted to trees.

11-3 This has been added to Section 3.6.2.1.

Natural Resources Defense Council, Inc.

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12

COMMENTS OF

NATURAL RESOURCES DEFENSE COUNCIL

ON THE

BUREAU OF LAND MANAGEMENT'S

DRAFT ENVIRONMENTAL STATEMENT

JACKSON-KLAMATH SUSTAINED YIELD UNITS

TEN-YEAR TIMBER MANAGEMENT PLAN

Submitted by

Trent W. Orr

July 16, 1979

The following are the comments of Natural Resources Defense Council, Inc. ("NRDC") on the Bureau of Land Management's "Draft Timber Management Environmental Statement, Jackson and Klamath Sustained Yield Units Ten-Year Timber Management Plan." While this statement represents some improvement over the draft prepared for the Josephine Sustained Yield Unit in 1978 in providing a bit more specific information on several points than did the Josephine DES, on the whole, it is extremely similar to the Josephine document, sharing most of its deficiencies. The JKSYU DES is virtually a carbon copy of the Josephine FES.

We find this extremely disappointing. While the interval between the draft and final statements for the Josephine might not have allowed adequate time to identify and correct all of the flaws in that DES, the BLM, we had hoped, would build on the experience gained in the entire Josephine process to create a more adequate process for assessing timber management on the Jackson-Klamath Sustained Yield Units ("JKSYU"). Instead of learning from the earlier experience, however, the BLM has merely mechanically repeated that experience.

NRDC finds the JKSYU DES inadequate for the following reasons: (1) it provides far too little information to describe adequately or to support the validity of the proposed action although it gives rise to concerns that the proposed action is not well-founded; (2) its examination of measures to mitigate adverse environmental effects of the proposed action is wholly inadequate; (3) it fails to assess properly the likely environmental

impacts of the proposed action in several important respects; and (4) it fails to evaluate a suitable range of feasible alternatives. Discussions of these four generic problems follow, accompanied by a concluding discussion of our concern that the BLM not overstep its statutory authority in an attempt to raise the JKSYUs' cut in the short-run in response to the Administration's recent announcement which concerned fighting housing inflation through increased federal timber harvests.

I. The Draft Is Inadequate because It Offers Too Little Information To Support the Validity of the Proposed Action or Even To Identify the Exact Nature of That Action

The greatest shortcoming of the draft is that it simply does not provide enough information to enable a reviewer to judge the validity of the proposed action. At the same time, it offers occasional bits of information which undermine the conclusion that the proposed action and, in particular, the level at which the cut is set are appropriate.

A. Forest Inventory

The DES gives no clear indication as to whether the proposed allowable cut is based upon an in-place survey. It appears from a reading of the text that this has not been done except in limited areas in connection with the preparation of actual timber sales during the past decade.

In the past, it has been the practice of federal timber management agencies to conduct forest inventories on the basis of surveys of random sample plots, the results of which are multiplied by the acreage of similar appearing land in aerial

photographs. This process has led to gross exaggeration of the amount of commercial forest land present, with errors in the magnitude of twenty to forty percent. The statement in the draft at p. 1-10 that commercial forest land was reinventoried in 1977 using "procedures for extensive inventory" does not dispel our fears about the accuracy of the sort of inventory that was employed for the Jackson-Klamath. The final environmental statement should provide much more detailed information on the methods used in inventorying timber resources and the reliability of those methods.

12-1

A related concern arises from our examination of the graphs at pp. 1-48 through 1-51. These graphs show that, for both the Jackson and the Klamath Units, while the amount of land on each considered non-forest land has increased since the 1970 allowable harvest computation due to stricter standards as to what is forest land, the amount of forest land considered commercial forest land has also increased on both units. Indeed, the area considered commercial forest land has increased so much that the combined acreage considered either non-forest land or non-commercial forest land has declined on both units. Nowhere are these startling differences explained. Are they a matter of statistical error in one of the inventories or is the BLM preparing the way for timber harvests on lands it once classified as non-commercial?

12-2

B. Low Intensity Management Lands

The BLM has classified certain commercial forestlands as "low intensiry management lands." These are lands which, although they meet the commercial forest land standard of capability to produce over twenty cubic feet of commercial conifer species per acre per year, are expected to have a regeneration period in excess of five years. The BLM plans a "trial harvest program" on these lands "to determine what practices, if any, might be effective to facilitate regeneration within the prescribed five year period, and to gather empirical data on the actual regeneration period." DES, p. 1-10.

There are two factors which make this "trial program" seem more like an attempt to minimize the overall decrease in allowable cut than a simple experiment. First is the size of the experiment: Over the ten-year course of the plan, nearly five thousand acres of low intensity lands -- over ten percent of the total acreage of such lands -- are to be harvested. DES, p. 1-24. This is a very large proportion of the total with which to be experimenting, especially given the great uncertainty as to the results. At most, an area one-fifth the size of that proposed seems appropriate.

12-3 Further, a similarly large "experiment" is being conducted in the adjacent Josephine Sustained Yield Unit. If that truly is a trial program and as the results of such a program are, by BLM's admission, unknown, does it not make sense to await the results of the Josephine experiment before proceeding with another? We fear this large scale "trial" for the JKSYU,

12-3 for which no adequate justifications regarding its size or its duplication of the Josephine trial are offered in the DES, is an exercise in raising the total harvest through practices that may turn out to be little more than timber mining.

C. Intensive Management Practices and the Allowable Cut Effect

On page 1-3 of the DES, it is stated that the present and future effect of the adopted intensive forest management practices are immediately reflected in the annual harvest: "This factor, often referred to as allowable cut effect, allows for immediate recognition of future growth levels that will occur in a managed forest." This contradicts the second guideline for timber management contained in the Senate Subcommittee on Public Lands report of 1972, quoted on page 1-4: "Increases in allowable cut based on intensified management practices such as reforestation, thinning, tree improvement and the like should be made only upon demonstration that such practices justify increased allowable harvests and there is assurance that such practices are satisfactorily funded for continuation to completion."

12-4 The draft does not adequately demonstrate that the various intensive practices upon which it bases an increase in the allowable cut actually justify such an increase. Table 1-7 on page 1-21 of the draft gives figures which are claimed to be the increases in harvest volume resulting from various intensive management practices, but nowhere are we told how these figures

were derived. The draft's treatment of three intensive management practices will serve as examples of its problems in this regard.

12-5 At page 1-20, herbicides are discussed as an assured means of increasing conifer growth. It is disturbing that this discussion not only omits any indication of how the alleged increase is quantified but also any mention of the deficiencies of herbicides as a growth enhancer. This discussion does not note that herbicides can cause direct damage to the conifers they are intended to help. (The draft asserts, at p. 3-26, that this effect, apparently unlike increased growth following herbicide treatment, cannot be predicted nor quantified.) Nor is mention made in the discussion at p. 1-20 of the fact that many broad-leafed species destroyed by herbicides are nitrogen-fixers, "nurse plants" to the growing conifers, or that reduction in competition does not necessarily aid all of the conifers in a given area.

12-6 Fertilization is claimed to justify increased harvests, yet no information is offered to show that fertilization has been demonstrated to increase conifer growth in southwestern Oregon by the amount predicted in Table 1-7, or by any amount, for that matter.

Finally, the claim that regeneration will be achieved within four years on high intensity management lands is called into question by the statement on p. 1-34 that adequate stocking cannot always be achieved through the initial planting but that

substantial replanting and interplanting is expected.

All of this argues for, at most, the use of extremely conservative estimates of the future effects of intensive management practices. Indeed, the draft itself, in discussing the 1971 allowable cut calculations, demonstrates the folly of over-reliance on the effects of planned intensive practices. A note on page 1-47 states that in the 1971 allowable cut determination it was assumed that "genetically superior planting stock would be used for reforestation, [but] [t]his has not proven to be the case, nor does it appear probable within the next 20 years." Also, no regeneration lag was assumed in the 1971 allowable cut, but for purposes of the new determination a four-year lag has been provided. These missteps in the past counsel caution in assembling the present plan.

D. SIMIX Computer Program

On page 1-22 it is explained that a computer program called SIMIX was used for making the allowable cut determinations. 12-7 There is nothing in the draft to indicate precisely how the program works, what data are required for its use, how the information is collected, what calculations are performed, or anything about it which would make it possible for one to judge the validity of the conclusions. The DES does state, however, that the model offers three cutting options: clearcutting only, three-stage shelterwood cutting, and a combination of the two. The text states that the actual practice will be none of these but is to be predominantly clearcutting and two-stage shelterwood

accompanied by planting. The draft simply asserts that the "net effects [of these two methods] on stand establishment, yields and volumes per acre are very similar. Therefore, the clearcut option of the SIMIX program was utilized." DES, p. 1-21.

Even if further information showed SIMIX to be a valid program, there would still be difficulties in relying on its determination of an allowable cut. On page 1-21 it is stated that the computer model determines the largest allowable cut sustainable over a forty decade projection period. "Age class distribution of forest stands, annual wood growth, wood volume and acreage of certain treatments are also determined for each of the 40 decades." This means that in order for the projected growth and yield to occur, foresters must locate every area of every condition and age class used in the program, and actually carry out the proposed treatment on those specific lands according to schedule. Owing to the fact that there may not be an in-place inventory of forest resources, the probability of being able to

12-8 carry out the program in this detail is very small. Without allowances for failure to do all the thinning and fertilizing indicated in the program in complete detail, the allowable cut must be excessive.

E. Conclusion

We find many indications in the draft that the allowable cut is too high, but we are simply not provided sufficient information to verify or dispel this conclusion. Vague reference is made

to the Management Framework Plan and to various other documents and procedures underlying the draft timber management plan but none are explained in sufficient detail to allow meaningful public participation as required by NEPA. The proposed plan itself is described in generalities and does not give complete information as to specific actions that will be taken, the locations for implementing these actions, or the sequence of events.

The FES must make clear how the lands were inventoried, how allowable cut was calculated, how benefits of intensive management were qualified, and so on. The draft is woefully lacking in all these respects. The public cannot effectively comment upon such a document but is expected, it seems, to accept it on faith.

12-9 II. The Draft's Discussion of Mitigation Measures Is Wholly Inadequate

Chapter 4, "Mitigation Measures Not Included in the Proposed Action," consists of this sentence:

> "With present technology, impacts identified in Chapter 3 are not mitigatable beyond those levels included in the proposal and described in Section 1.3 as project design features."

This is to say that there are no possible mitigation measures that could be taken that have not been taken as "project design features." This is patently absurd.

The discussion of a wide range of mitigation measures is essential for compliance with NEPA. Baldly asserting that the mitigation chosen is all the mitigation possible hardly meets

this standard. The draft acknowledges throughout numerous adverse effects that will result from the proposed action on air, soil, water, wildlife, vegetation, and other forest resources.

What Chapter 4 seems to mean really is that mitigation other than that provided would reduce the proposed harvests or otherwise alter the plan. This is no reason not to discuss other mitigation measures. The point of the NEPA requirement is to make the public aware of a variety of methods that could mitigate environmental harm from a proposed action and of the costs of using such methods. It is tautological that the methods chosen fit the plan exactly as proposed, but the DES should not rest on tautologies. Mitigation measures addressing the adverse impacts identified in the draft and not wholly consistent with the plan as proposed must be fully discussed in the final.

III. The Draft Environmental Statement Is Inadequate because It Fails To Assess Clearly and Fully the Adverse Environmental Effects of the Proposed Action

As with the Josephine environmental statements, the JKSYU DES fails in three ways to discuss adequately the impacts of the proposed action: (1) it often fails to give a clear picture of what the overall adverse effects will be, (2) it fails to relate adverse effects to specific sites within the units, and (3) it fails to examine the impacts of the proposed action when viewed cumulatively with the actions of private landowners and other government agencies in the vicinity of the JKSYU or the cumulative impacts of the various components of the proposed action.

12-10 A glaring example of the first problem, failure to present a clear picture of the overall adverse impacts of the proposal, can be seen by comparing information given on impacts on soils with that given on impacts on water. At page 3-9, the reader is told that the proposed management plan would result in the erosion of nearly 64,000 tons of soil. Yet at page 3-18 we are told that the sediment yield attributable to the disturbances entailed in the proposed plan would be 15,650 tons. Where, one wonders, did the other 48,350 tons of eroded soil go? A disparity of this magnitude must be explained in order for the reviewer to know what it is he or she is commenting upon.

12-11 A less startling but more common problem than such inconsistencies is the simple failure to provide enough information about impacts. For example, a brief paragraph on page 3-26 is the only information given on the effects of herbicides on non-target vegetation. This scant treatment is very tentative -- "agricultural crops, stream buffers and rare or endangered species may be affected .... Herbicide application may result in short-term damage (or even destruction) of conifer stands" -- and inconclusive -- "These types of impacts defy accurate prediction and, therefore, cannot be quantified." For the reviewer to react knowledgeably to the proposed action's reliance on herbicides, much more information than this summary writing-off of a potentially serious problem is essential.

The draft's failure to relate impacts to specific sites is perhaps best illustrated by its disquieting statements about likely effects on various fish and wildlife species. We are

told at page 3-38: "It is possible that impacts [on fish and other aquatic life] could be significantly harmful in some local sites in a worst case situation. Lacking site specific information, these local instances are impossible to predict." Essentially the same dodge is taken in discussing otters. DES p. 3-41. How can the DES on the proposed plan be said to have considered adequately the impacts of that plan when, by its own admission, not enough information has been collected to identify what impacts will occur or where? To answer that these impacts will be dealt with in environmental assessments later is not a proper response. It is this proposed timber plan which sets a certain cut for a certain number of acres which will lead to these adverse impacts. They must be fully examined before a decision is made on the final plan, not put off to later site assessments which will not attract public attention and which may be useless once an overall plan is approved. The site-specific adverse impacts identified at that time may well be identified as insignificant or, at any rate, unavoidable since the already approved plan mandates harvest of the site. 12-12

Finally, the impacts section fails to look at the cumulative effects of BLM's proposed actions in the JKSYU with those of private landowners and other government agencies operating in the same area or at the cumulative effects of BLM's various proposed actions considered together. As to the first, for example, the DES should examine the effects of its proposed action on air quality (through burning) and water quality 12-13

(through sedimentation) in light of similar effects from neighboring actions by others. The draft should also pull together the impacts on various forest values of all proposed activities to present a picture of the overall impact of the proposed action on the JKSYU. Assessment of cumulative impacts is essential to rational decision making as to the form the overall plan should take. 12-13

IV. <u>The DES Fails to Consider an Adequate Range of Feasible Alternatives</u>

The draft is faulty in that three of the five alternatives examined are not feasible and in that it does not examine several important options which should be considered. The discussion of alternatives would also be made much more relevant to the reviewer if the various impacts of each alternative were explicitly compared to those for the proposed action (to which these are alternative) in addition to the present situation. 12-14

Alternatives 1 and 2 are feasible, for they both present approaches compatible with the legal requirements upon BLM to manage for sustained yield. However, they appear somewhat unlikely to be chosen by BLM over the proposed action because they result in smaller yields than it does.

We believe the BLM should examine alternatives which would produce substantially the same cut as the proposed action but which would use different management activities.[1/] For example, 12-15

1/ We are, of course, assuming in this statement a proposed action in which the cut is properly set at a true sustained yield level. For our doubts as to whether this is the case with the current proposed action, see Part I, above.

12-15 an alternative more likely to be accepted than Alternative 1 would be one which, like 1, dispensed with broad-scale use of herbicides, but used site-specific labor intensive and other methods to control competing vegetation where appropriate. Such an approach might result in an equivalent yield to the proposed action while eliminating the harmful impacts of herbicides and supporting the local economy.

12-16 Another alternative which must be examined is one which truly provides for the multiple use of the twelve percent of the JKSYU lands which are not O&C Lands. Regardless of what the law requires of management of O&C lands, regular public domain lands within the JKSYU must be managed for multiple uses under FLPMA. <u>See</u> 43 U.S.C. 1701(a)(7).

Yet it appears from the text and a map included with the DES that wherever commercial forest land is present on non-O&C public lands, it has been routinely included in the allowable cut base. In light of BLM's restrictive interpretation of the O&C Act as a near total restraint on management of O&C lands for anything but timber, the opportunity to use so-called high intensity management lands on non-O&C lands for purposes other than timber should be carefully examined as a means of counterbalancing the primary-use management of O&C lands. The DES is silent on this point.

12-17 The final three alternatives that are offered, Alternatives 3, 4, and 5, are all unrealistic as each would violate the policies of sustained yield and even flow which govern BLM's

management of its timber lands. Alternative 5 is even more clearly unrealistic as it is the very management system (the present situation) which is discredited by the DES. While one such alternative of the sort represented by these three might be useful for comparison's sake, it is not sound analysis to pose as a majority of the proffered alternatives ones which cannot and should not be implemented. The DES should present several more reasonable and practicable alternatives in place of these illegal and unsound proposals.

V. <u>The Final Plan Cannot Legally Increase the Allowable Cut above a Level That Can Be Sustained</u>

The DES gives no indication (as it could not, having been prepared before the fact) of the BLM's reaction to the announcement of Alfred Kahn on June 11, 1979, that the Administration desires temporary departures from sustained yield levels of timber harvest on all federal timber lands to combat inflation in housing costs. We fear that this announcement will cause harvests to be conducted on the JKSYU and other BLM sustained yield units far larger than can be sustained over time. Indeed, a short article in the most recent <u>BLM News Clips</u> specifically states that "[t]he Josephine and the Jackson-Klamath will be the first [units] to which the new policy [of temporary annual increases] will be applied." "New Timber Policy Announced by Andrus," <u>BLM News Clips</u>, July, 1979, p. 3.

We feel it is essential to point out that FLPMA (43 U.S.C. §§ 1701 <u>et seq</u>.) and the O&C Lands Act (43 U.S.C. §§ 1181a <u>et seq</u>.)

both mandate harvest of timber on a sustained yield basis. Unlike the National Forest Management Act (16 U.S.C. §§ 1600 _et seq._) which governs the Forest Service's setting of harvest levels from the National Forest System, neither FLPMA nor the O&C Act allow departures from sustained yield levels of harvest _for any reason_. Under the dictates of these laws, any harvest proposed in the JKSYU FES must be sustainable indefinitely.

VI. Conclusion

The Jackson-Klamath Sustained Yield Units Draft Environmental Statement is inadequate for a variety of reasons. It fails to give adequate information to enable the reviewer to assess the validity of the actions it proposes or even to know what, precisely, the timber management plan is and how it relates to an equally ill-defined management framework plan. Discussion of mitigation measures is so brief as to be almost nonexistent. Impacts of the proposed action are neither as clear nor as thorough as NEPA requires. Finally, the discussion of alternatives is focused too much upon alternatives which are not feasible and too little upon realistic alternatives to the management assumptions of the proposed action. NRDC strongly urges BLM to correct these critical deficiencies in its preparation of the final statement.

Response to comments in Letter 12

12-1 The methodology incorporated in the varioua inventories is much too lengthy and detailed to be included in an environmental statement. A complete description of inventory procedures used, along with an explanation of how their reliability ia measured, is available in the Oregon State or District offices in weatern Oregon.

Of the three typea of timber inventory employed in development of the proposal (see Sections 1.2.1, 1.2.2 and 1.2.3), only the reinventory, which utilized measured plots, can be statistically analyzed for reliability. Section 1.2.3 has been expanded to show that the sample is within 7 percent of true mean volume at one standard deviation.

12-2 See response to comment 1-3

12-3 While the trial harvest program proposed for the JKSYUs may involve some treatments and approaches duplicated in the Josephine SYU, an additional variety of experimental opportunities are provided in the Jackson and Klamath SYUs. Taken together, the three SYUs ahould provide examples of areas exhibiting most southwest Oregon timber management problems for research under the FIR program discussed in Section 1.4.2. See also responae to comment 1-2.

12-4 The following summary is provided to explain how increases in allowable cut which result from various intensive management practices, as shown in Table 1-7, were derived.

A BLM young-growth management committee was formed for the JKSYUs in July 1977. After analyzing technically feasible management practices, the committee made economic feasibility studies of these practices.

Yield projections for those practices having a benefit/cost ratio exceeding 1:1, when assuming full benefit of allowable cut effect, were then derived using the USFS Douglas-fir Interim Tables (D.F.I.T.) Stand Simulator Program (Bruce et al. 1977). This program incorporates the lastest available research information regarding yields attributable to the various intensive management practices.

The committee then developed managed stand yield tables. Management practices considered in preparing the yield tables were precommercial thinning, commercial thinning and fertilization.

12-5 Further discussion of impacts to non-target vegetation has been added to the text in Section 3.5.1.4.

Potential benefits from nitrogen-fixing species is recognized. At present, definitive data on optimum densities, in relation to conifers, magnitude of benefits, etc., for species found in the JKSYUs are not available, but studies are in progress. At such time as data are available which identify favorable relationships, full consideration will be given to the use of nurse crops in forest management programs.

12-6 See response to comment 1-5.

12-7 The basic allowable cut model is SIMAC. SIMIX is basically SIMAC with minor changes. SIMAC has been in use since 1970. It is generally recognized in the forestry profession as one of several conceptually valid allowable cut models. A detailed discussion of the model and how it functions is contained in USFS General Technical Report PNW-1, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon 1972.

12-8 The various types of treatments and the acreage by age class to which they are applied are inputs, not outputs of the model. The prime source of data for these inputs is the Operations Inventory which is an in-place inventory designed to identify each individual stand or groups of stands and to annotate each with a recommended silvicultural treatment. The Operations Inventory is described in Section 1.2.2 of the ES.

12-9 See response to comment 1-6.

12-10 See response to comment 1-4 and changes in Section 3.3.2.3.

12-11 See response to comment 12-5.

12-12 The 10-year timber management plan analyzed in this ES predominately relates to annual harvest level and associated treatments. Representative timber sale plans and a herbicide plan were used to gain some insight to site specific impacts. Should detailed, site specific environmental assessment disclose significant impacts on a particular harvest area, that area could be excluded from harvest. The dominant issue is attaining total annual harvest. Given environmental and managerial constraints there is full flexibility on where harvest is to occur within those lands identified as high/low intensity management forest lands.

12-13 Table 1-11 displays the best information available on annual timber harvest and management treatments within the Rogue River basin. Included are other jurisdictions intermingled (checkerboarded) with public lands administered by BLM in the JKSYUs and adjacent Forest Service areas. It can be assumed that BLM and the Forest Service will annually offer for sale an amount of timber close to their respectively determined allowable cuts and undertake forest development practices at rates projected in allowable cut calculations. Any projection of harvest from private lands would be highly speculative since that is dependent on the economy and building starts in addition to standing timber inventory.

If an assessment of cumulative impacts were possible, the most substantive area of concern would be intermingled lands, primarily private ownership. It would be shown that these lands are essentially roaded with little or no new road construction required before harvest. The ratio of acres to volume in Table 1-11 suggests that harvest from private lands has been primarily final harvest cut and relogging. Standing private timber inventory is unknown.

Forestry Program for Oregon (Oregon State Board of Forestry 1977) shows a great shortfall of merchantable timber from private lands for the next several decades in the Medford Timbershed. Thus logging as an impactor would be assumed to occur at a decreasing rate. Impacts associated with forest development projects on private lands would be simular to those identified in Chapter 3. The narrative in Chapter 6 attempts to reach conclusions identifying the effects which will result and trade-offs to be made if the proposed action is implemented, rather than simply summarizing the impacts.

12-14 In Table 8-4, quantifiable impacts of each alternative have been compared to both the existing situation and the proposed action wherever possible.

12-15 BLM is committed to thoroughly and fairly considering non-chemical methods of vegetation control on a tract-by-tract basis. Therefore, in preparing annual vegetation plans, emphasis will be given to the use of mechanical and manual control methods whenever silviculturally and economically feasible.

A discussion of non-chemical methods of vegetation control can be found in Chapter 8 of the final ES, Vegetation Management with Herbicides: Western Oregon 1978 through 1987 (USDI, BLM 1978d).

12-16 Of the 56,178 acres of public domain land in the SYUs, some 25,000 acres are commercial forest land. Of that area, approximately half, or 12,500 acres, is designated for high intensity forest management. Thus, some 43,500 acres, or nearly 78 percent of the public domain land, is dedicated to uses other than intensive timber management.

12-17 The object of a section on alternatives is to explore and objectively evaluate all reasonable alternatives and to present them in comparative form in order to define issues and provide a clear basis for choice to the decisionmaker. This includes reasonable alternatives not within the jurisdiction of the agency proposing the action. Thus, that some of the alternates do not follow current policy is not seen by BLM as illegal or unrealistic.

BLM's basic policy is to plan for a non-declining sustained yield harvest level over time. In some instances, however, there is in place an excess of merchantable timber volume over and above that which is needed to provide for long-term, non-declining harvest. On May 28, 1979, the Secretary of the Interior adopted a policy clarification which allows excess volume to be utilized provided the following criteria are met:

1. The accelerated harvest level allows for the early attainment of a regulated forest growing at its sustained-yield capacity.

2. A reduction in mortality and accompanying timber volume loss is realized.

3. Such action minimizes projected timber supply shortages.

4. Such action minimizes the impacts of any decreases from the existing allowable cut levels.

5. Such action must not result in future decreases below the non-declining level.

6. Such temporary increases must not exceed the ultimate sustained-yield capacity of the land.

Alternative No. 3 meets these criteria and thus is a viable and realistic option.

Forestry Program for Oregon (Alternative No. 4) is a major proposal of the State of Oregon. It is useful to assess the capability of the JKSYUs to provide a share of the projected statewide timber shortfall.

CEQ regulations for implementing the procedural provisions of NEPA require that a no action alternative (Alternative No. 5) be included in each ES. Since it represents the existing situation, it provides a valuable comparison point.

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July 16, 1979

Oregon State Director (911.1)
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Mr. Storms:

The Department of Energy (DOE) appreciates the opportunity to comment on the Draft Environmental Statement for the Jackson - Klamath Timber Management Plan.

Four of the responsibilities assigned to the DOE when Congress enacted the DOE Organization Act (42 USC 7101) were:

(1) To promote effeciencies in the use of energy resources (15 USC 764(b)(7));

(2) To promote maximum possible energy conservation measures in connection with the activities within the jurisdiction of the heads of other Federal Departments and agencies (42 USC 7112(2);

(3) To place major emphasis on the development and commercial use of solar, geothermal, recycling and other technologies utilizing renewable energy resources (42 USC 7112(6)); and,

(4) To provide for the cooperation of Federal, State, and local governments in the development and implementation of national energy policies and programs (42 USC 7112(11)) (emphasis added).

This Regional Office is utilizing the EIS comment process as one way to fulfill these responsibilities assigned to the DOE by Congress. This Office, therefore, reviewed the referenced Draft EIS to determine not only the specific impact of the alternatives on energy consumption, but also to assess: (1) the adequacy of the broad consideration of energy use, (2) the type and nature of energy use, and (3) the consideration given to energy conservation efficiency and renewable energy resource use.

Letter to Mr. Storms
from R.B. Hackman
July 16, 1979
Page 2 of 3

We found the Environmental Statement to contain an excellent energy analysis for the proposed project and its alternatives, however there is one additional area you may wish to address in the Final.

13-1 The ES does not presently include a consideration of the indirect energy effects of increased road construction, such as increased motorized recreation. The energy effects of the alternatives will differ due to the variation of recreational experiences they would provide. This consideration should be included in the Final Environmental Statement.

13-2 Also, we suggest that the consideration of energy use be expanded in the discussion of adverse effects which cannot be avoided. Similarly, any discussions of the adverse effects of logging operations, road construction, slash disposal, and motorized vehicle use should include brief mention

13-3 of their adverse energy impacts. The EIS should also indicate that measures will be taken to mitigate excessive or unnecessary energy consumption due to the implementation of the alternative eventually selected.

This Office again thanks you for this opportunity to review and comment on your EIS. We trust our comments will be helpful to you in the preparation of the Final Environmental Statement, and in your further consideration of the alternatives. We recognize that the energy impacts of the timber management alternatives under consideration are often "hidden", yet they are pervasive. If we may be of further assistance, please do not hesitate to contact us.

Sincerely,

Robert B. Hackman

Robert B. Hackman, Director
Office of Assesment & Intergation

Letter to Mr. Storms
from R.B. Hackman
July 16, 1979
Page 3 of 3

cc:
Lee Johnson, Director, External Affairs Staff Region X, DOE

Dr. Robert Stern, Director, Division of NEPA Affairs, Office of tbe Assistant Secretary for Environment, NDOE

F.A. Leone, Division of NEPA Policy and Planning, Office of the Assistant Secretary for Environment, NDOE

Paul Brumby, Director, Federal Programs Office, Office of the Assistant Secretary for Conservation and Solar Applications, NDOE

David Phillbrick, Director, Renewable Resource Programs, Oregon Department of Energy.

Response to comments in Letter 13

13-1 Visitor-day reductions due to adverse impacts upon recreational experiences would tend to balance increases in visitor days in activities which would be beneficially impacted. Energy consumption as a result of changes in recreational visitation is assumed to change accordingly. Data are not available to specifically quantify these changes.

13-2 Chapter 5 now considers energy use as an adverse impact which cannot be avoided.

13-3 Table 1-10 (p. 1-42 of the DES) states that conservation and efficient use of energy sources are objectives in all BLM activities. No measures to mitigate impacts to energy are proposed other than those inherent in the proposed action.

NORTH WEST TIMBER ASSOCIATION
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TELEPHONE (503) 686-9603

July 16, 1979

Mr. Murl Storms
Oregon State Director
Bureau of Land Management
P.O. Box 2965
Portland, OR 97208

Dear Mr. Storms:

On behalf of North West Timber Association I am pleased to comment on the draft Timber Management Environmental Statement for the Jackson-Klamath Sustained Yield Units. Our Association consists of small lumber and plywood manufacturers in western Oregon which are nearly 100 percent dependent upon federal lands for their timber supply. Obviously several of our members will be directly impacted by the decisions made in this timber management planning process.

The ultimate determination of allowable harvest which is so important to the timber dependent segment of the economy is a function of land base allocations, timber inventory and growth, level of investment, and BLM policies. In reviewing the draft statement we have concerns with several of these factors which I would like to discuss.

Intensive Timber Management

Your dedication to the utilization of intensive management tools including herbicides and fertilization is much appreciated and has our total support. Your move from a three stage to a two stage shelterwood as the primary harvest system was, in our mind, a sound action both in terms of efficient management of the public timber resource and protection of the environment. The only disappointment in your program has been the move away from the planned use of genetically improved planting stock. While we recognize the problems that have been encountered in developing adequate seed we urge that you continue with the development of the program and incorporate it as soon as possible.

Land Base Allocations

With an increase in inventory on the Jackson-Klamath unit in excess of one billion board feet over 1970 and a move to more intensive management, it is disappointing to us to see a preferred alternative which would reduce the annual harvest by 8 MMBF. The cause, of course, is the change in land base allocations which was

the result of the TPCC process. With 68,000 acres removed from the calculation base the TPCC appears to have been the most significant decision procedure in the process.

As you know, based on work by Mason, Bruce and Girard, Industry and other groups have seriously questioned the quality of the TPCC. We feel that many lands may have been thrown out of the high intensity base without adequate justification. We are again urging that the TPCC be revised and that any changes indicated be incorporated immediately without waiting for the next timber management planning process, some 10 years hence.

Your experimental program on the low intensity land is certainly a step in the right direction. Hopefully, when this work is combined with new techniques developed by the Forestry Intensified Research Program and an improved TPCC we can return many of these productive timberlands to the base.

14-1 In regard to your experimental program on the low intensity management lands, I am concerned that you plan to plant only half of the acres cut, depending on natural regeneration for the remainder. Since the main reason these lands were withdrawn was regeneration problems it would seem that indeed the most intensive efforts should be concentrated on these sites. It would seem that every effort possible should be made to overcome the regeneration problems on these sites. There is no doubt that the rapidly increasing value of the timber resource will more than justify the economics of the situation.

Economics

In reviewing the economic analysis section of the statement (p. 2-58 to p. 2-69) I was disturbed by several factors. There seemed to be an effort to downgrade the importance of the timber industry in the local economy and to predict a major downfall in the industry itself. While on a percentage basis the timber industry may become less important in light of the rapid population growth in the Jackson-Klamath area, the future health of the industry will depend to a great extent on how the BLM and other agencies manage their resources.

14-2 I cannot agree with the rapid decrease in employment/MMBF projected in your analysis. Your projections are based on work done by Brian Wall which basically takes past trends and simply extends them forward. This concept fails to recognize that automation is becoming increasingly difficult and expensive. Those areas of manufacturing which are most easily adaptable to mechanization were the first to be automated. The need for flexibility in movement and decision making both in the woods and the mill are rapidly reducing opportunities for automation. We are also reaching a point where increases in recovery from a given log volume (through better sawing, thinner saws, etc.) cannot be expected to continue at past rates. Also, ignored in the analysis is the fact that increased environmental and resource protection requirements of the operator are and probably will continue to increase the labor intensity of the woods operations.

14-3 I also have serious concern about the use of the employment multipliers for the unit. It appears that either the wrong multipliers have been used or they have been used improperly. The resulting job impacts appear extremely low.

14-3 For example, you show a job multiplier for Douglas County of 1.562 and conclude that each million board feet harvest results in (7.38 x 1.562) 11.5 jobs in the community including the industry jobs. In their analysis of Douglas county (Douglas County Timber Supply Economic Impact Analysis to Douglas County Commissioners, May 1977) Beaton and Hibbard found the secondary jobs multiplier to be 1.57 for a total jobs multiplier of 2.57 indicating that the total jobs per MMBF would be closer to 20. If the multiplier used in the BLM draft statement was a secondary employment multiplier and the 11.5 was thus added to the 7.38 for a total of 18.9 jobs/MMBF this would appear to be more in line. If an error has been made it will clearly have a very significant effect on the entire analysis. I recommend that this section be closely reviewed, possibly by an outside economist.

14-4 Besides the possibility that the jobs have been understated, I was also concerned by your conclusion that the proposed action would result in employment "about the same as that expected under current management" because the jobs lost in industry would be replaced by equal or more jobs in "forest development". This does not discuss the quality of jobs, their full or part time nature, their pay levels or the fact that if the harvest were maintained or increased that total jobs available could be increased.

Utilization Of Surplus Inventory - A Preferable Alternative

Clearly since the issuance of the draft statement there has been a significant change in timber policy for the BLM lands. This policy will "allow temporary annual increases, where feasible, in timber harvested from forests managed by BLM." It is particularly important to note, as reported in BLM News Clips (July 1979), that "the Josephine and Jackson-Klamath will be the first ones to which the new policy will be applied." Obviously, the decision now is not whether to accept the preferred alternative, but whether to switch to Alternative 3-A or 3-B both of which assure the long run sustained-yield of the preferred alternative while allowing for the utilization of the excess inventory.

On behalf of our membership, I would like to recommend Alternative 3-A as the preferred alternative in the final statement. There are a number of reasons for supporting this alternative which would utilize the excess inventory during the first decade before dropping to the harvest level of 120 MMBF.

This alternative would make available approximately 41 MMBF of additional timber to help offset the over 130 MMBF that has recently been lost from local federal lands due to land use allocations, special use restrictions and wilderness expansion. If this policy is also applied to the Josephine Unit the harvest (due to the Inventory) would only increase 5 MMBF. Thus total application of the policy to the Medford district can increase harvest 46 MMBF, roughly offsetting the reductions in the preferred alternatives.

While one might argue that to utilize the Inventory in one decade would cause too much decline in the next decade, I would point out that your current plan for the two units will cause the same reduction at this time. Furthermore, with the knowledge that a reduction is coming the businessman can manage his capital assets to recover a greater percentage of their useful life and schedule, if necessary,

a reduction or phase out of his operations. Also, Alternative 3-A provides about 1600 man-years of work more than 3-B.

Contrary to those, including the BLM, who consider a major decline in the Industry as inevitable, there is room for promise in the matter of timber supply. If the management tools and financing are available, increases in harvest levels on local Forest Service lands are possible within the next decade. Large excess inventories on some local national forests also provide an opportunity to balance other reducing supplies. Such a deviation from even-flow is several years off, but could balance the shortage for several decades. Also, we are confident that through the efforts of the FIR program and a new TPCC that the Medford BLM harvest will be significantly increased in the next TM planning process.

14-5 I was particularly disturbed by some comments made in the draft statement to justify rejection of Alternative 3-A. It is stated that the alternative would, "contribute to the overall instability of the industry", and that the industry would have to "increase and improve their timber handling capabilities during the 1980's and then drastically reducing them in the 1990's". (p. 8-20) This is pure nonsense. The capacity now exists and thanks to other government actions the supply is already being reduced. Alternative 3-A offers an opportunity to add some stability to this volatile situation and, as pointed out above, there is some hope for a more stable timber supply beyond the next decade.

We believe that the Medford BLM has not only an opportunity, but a responsibility, to move forward with utilization of the excess inventory. It is in the best interest of the dependent communities which will suffer immediate damage without such action.

I appreciate the opportunity to submit these comments. I am certainly available, and would welcome the chance, to participate in further discussions that may develop regarding establishment of the final EIS.

Sincerely,

Dennis Hayward

R. Dennis Hayward

bjw

cc: George Francis

Response to comments in Letter 14

14-1 Soils in many of the areas identified as low intensity are shallow and rocky and are not conducive to planting bare root or containerized seedlings. It would be difficult and time-consuming to locate micro-sites in which seedlings could be planted. With the natural distribution of seeds, some seeds would fall on micro-sites with adequate soil and moisture to permit successful germination. Natural regeneration as well as seed spotting would be relied upon in these areas. (See text change in Section 1.3.2.1.)

14-2 The projections of decreasing labor requirements are the most recent, comprehensive and authoritative available. Although these are historic trends, extension of these trends is not strictly linear. The analysis assumes that, due to competition from other firms, the trend toward automation will continue as long as the marginal revenue gained from adopting improved technology exceeds the marginal cost. Changes in management practices will also relieve the labor intensity of harvesting and processing. For example, harvesting smaller timber may contribute to gains in productivity in the sawmills, veneer and plywood mills, and paper and allied products subsectors. Even if the projected labor requirements in logging are understated, the effect on total labor requirement projections would be minor. Since logging accounts for about 20 percent of the total labor requirements, a 30 percent error in this projection would only cause a 6 percent error in the projected total labor requirement for harvesting and processing.

14-3 The Douglas County employment multipliers used by Beaton and Hibbard were derived using a rough estimating procedure based on an economic base study of community economic interdependence. The DYRAM model supplied multipliers for each of the four counties which process timber from the JKSYUs; not just one county. In addition, the income multiplier for Douglas County developed by the BLM Socio-Economic Data System does not differ significantly from those developed by Russell Youmans et al., in <u>Douglas County, Oregon: Structure of a Timber County</u> (Oregon State University 1973); a relatively sophisticated model. These DYRAM employment multipliers are ascertained through the Socio-Economic Data System by the average earnings per worker in each industrial sector. The differences in employment multipliers among counties results from difference in community economic structure, e.g., the local availability of support services and supplies. Other variations in multipliers can result from differences in base year.

14-4 Section 3.14.1.1 indicates that employment in logging, sawmills, and veneer and plywood mills would be expected to decline by about 40 full-time jobs while forest development employment would increase by as much as 50 full-time equivalent jobs. Section 3.15.1 indicates that the "workers who would lose timber related jobs and those who would fill the forest development jobs are not necessarily interchangable." This section describes the expected differences in the two types of jobs i.e., pay levels, relative safety, full time or part-time nature, and the perceived image of each type of work.

14-5 The text in Section 8.3a.12 has been revised to indicate that the initial extra volume could offset reductions in timber harvest volume that could come from both Federal and private sources.

15

INDUSTRIAL FORESTRY ASSOCIATION

SERVING FOREST OWNERS, LOGGERS, WOOD USERS
THROUGHOUT THE DOUGLAS FIR REGION

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July 17, 1979

Oregon State Director
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

SUBJECT: Comments on Draft Timber Management Environmental Statement
Jackson-Klamath Sustained Yield Units

Dear Sir:

We believe the BLM would be more in line with recent presidential direction if Alternative No. 3A was chosen as the proposed action. Even without such direction it would seem to be the best choice.

15-1 We see very little difference in impacts between this alternative and the proposed action. We cannot agree that this alternative would contribute to the overall instability of the industry as stated on page 8-20. Rather the extra volume would serve to offset the reduction of timber harvest volume on the Josephine Unit and Siskiyou National Forest giving industry some time to adjust to the changing timber supply situation.

<u>SPECIFIC COMMENTS</u>

15-2 Page 1-2: A total of 4,900 acres of low intensity lands are listed for regeneration cutting. Only 2,450 acres are scheduled for planting. It seems to us that all acres scheduled for regeneration cutting should be slated for planting. Also on this page, limited management lands are not scheduled for any management. 15-3 An experimental program involving at least enough acres to support an annual cut of 1 MM feet should be scheduled for these lands. This schedule should be tied in with the F.I.R. program as well as the program on low intensity management lands.

15-4 Page 1-4: Under Harvesting Limitations - Clearcutting should be used only where "It is determined to be silviculturally desirable"--rather than "essential."

Page 1-7: This chart should be changed to add an Operations Inventory, a Trial Harvest Program and an Annual Trial Harvest of 1 MM board feet under Limited Management Lands.

Page 1-10: Under Limited Forest Management Lands the statement is made that "Regeneration time, if these lands were logged would be considerably in excess of five years and successful reforestation would be uncertain." A trial harvest program under F.I.R. would test the validity of this statement, as well as the referral to "probable site degradation" in the next paragraph.

Page 1-14: We question the necessity of allowing no timber harvest in stream buffers. Such areas can be managed to protect streams sides and water quality and still allow utilization of other resources.

15-5 Page 1-16: It is not clear if any Peregrine Falcons utilize the Peregrine Falcon habitat in the Klamath River Canyon.

Page 1-17: VRM Class II lands should be reviewed to make sure all lands classified as such deserve the classification.

15-6 Page 1-28: Scope of Treatment - We question basing a regeneration cut on removal of 30-60 per cent of basal area. The main concern of the shelterwood system is to leave enough well distributed trees per acre to provide protection for the planted seedlings. Basal area would seem to be a poor indicator. Shelterwood trees have to be removed after a few years so some consideration should be given to this when selecting leave trees.

15-7 Page 1-29: Second Paragraph. Reforestation of low intensity lands should not depend on natural seeding. These lands should be planted, natural seeding is too uncertain.

15-8 Page 1-42: LCDC Goal VII Discussion. This statement regarding protection of hazard areas is not clear.

15-9 Page 2-54: Line 7. Medford is not a center of paper manufacturing, maybe this should have been plywood.

Page 5-3: Paragraph 8. We question whether the reduction of pocket gophers on 9,000 acres would be an adverse impact.

Page 5-4: Wilderness. Any lands suitable for wilderness classification are being currently studied under BLM program.

Page 7-1: Irreversible and Irretrievable Commitment of Resources. This section should be rewritten with emphasis on actual irreversible and irretrievable commitment of resources and not just possible detrimental impacts of land management decisions.

Thank you for the opportunity to comment on the EIS. Please contact us if you have questions on any of our comments.

Sincerely,

George E. Knowles
Director of Public Forestry

GEK:lf

Response to comments in Letter 15

15-1 Refer to changes in the text (Section 8.3a.12) and response to comment 14-5.

15-2 See response to comment 14-1.

15-3 As part of the research under the FIR program, there may be some timber cutting on limited forest management lands. No commitment to a specific harvest level can be made, however. Any such commitment on these lands would have to await results of the FIR program and could then be incorporated into the next decadal timber harvest plan.

15-4 This wording is a quote from the summary of a U.S. Senate report and cannot be altered by BLM.

15-5 See Section 2.8.3

15-6 Normally, the leave trees in a shelterwood cut are marked under a set of criteria which includes: (1) the number of trees needed per acre to provide the proper amount of shade, (2) the selection of only dominant and codominant trees and (3) the selection of trees that are the best formed and in healthy condition to ensure survival and an economical harvest in the future. The reference to basal area in Section 1.3.2.1 is an indicator of the basal area of the stand that would be affected.

15-7 See response to comment 14-1.

15-8 Areas of Natural Disasters and Hazards are areas that are subject to natural events that are known to result in loss of life or endanger human activities or structures. Stream floods, landslides, rock falls, earthquakes, weak foundation soils and other hazards unique to local or regional areas are some of the possible natural disasters and hazards. Developments such as roads, buildings, trails, campgrounds, etc. will not be planned or located in known areas of natural disasters and hazards without appropriate safeguards.

15-9 The text in Section 2.17 has been revised.

ASSOCIATION OF O & C COUNTIES

16

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July 21, 1979

Mr. Murl Storms, State Director
Bureau of Land Management
P. O. Box 2965
Portland, OR 97208

Subject - Draft Environmental Statement for Jackson-Klamath MU

Dear Murl,

President Geo. Calvert and the Executive Committee of the Association of O&C Counties has directed me to submit the following response to the Jackson-Klamath Draft Statement. In addition, the Association has retained the firm of Mason, Bruce and Girard to review the proposed statement and report to us those items of county concern - a copy of that report is attached and is to become a part of this response.

We are pleased with the thoroughness of the Draft Statement and appreciate BLM staff effort to condense the many complex issues to understandable form. However, in addition to the issues discussed in the Mason, Bruce and Girard report, we wish to re-emphasize two major concerns, (1) the in-accuracy of the TPCC and its use, and (2) the selection of the harvest level.

Enclosed is a copy of a report to us from Mr. Glenn Zane who did some review work for us relative to the TPCC. He indicates that the same errors are present in the Jackson-Klamath as were found in a more intensive review of the Josephine a couple of years ago. We also note that the language on page 1-8 of the Josephine Statement that deals with correcting TPCC errors found during interim on-site analysis has been slightly modified in the corresponding language of the Jackson-Klamath Draft, also on page 1-8. The change implies that errors should only be noted so that future management plans may be altered
16-1 on specific sites rather than altering the present plan. Since the TPCC was not used to determine inventory plots, it seems unreasonable to us that the change must await the next decade management plan. The Glenn Zane Letter explains the problems incurred.

The proposed Level of Harvest misses an opportunity to efficiently utilize the timber resource on a sustained basis and at the same time enhance community stability - one of the prime objectives of the O&C lands as directed by the McNary Act. We do not mean to imply that the O&C lands must necessarily compensate for the changing harvest plans of other ownerships, but with a 400MM board feet of surplus inventory the BLM has a unique opportunity to be of service in off-setting other supply reductions including their own.

Sinse the Josephine and the Jackson-Klamath Units serve the same general market area, Alternate 3b or some modification of Alternate 3 would go a long way in minimizing the adverse effects of the recent reduction applied to the Josephine Unit. In any event we do not see the wisdom of frittering away some 400MM BF of mature timber just for the sake of strict evenflow. Our view in this regard seems to be shared with the sustained yield interpretation of Sec. Andrus as expressed in the enclosed July issue of BLM Clips.

We are not asking that a higher level of harvest now in exchange for future reductions below the sustained long term level - we simply do not wish to waate an opportunity to capture the use of surplus inventory that is otherwise lost through even-flow. We are, however, optomistic that higher cut is attainable in future plans as new technology becomes available. The Forestry Intensified Research program and more accurate TPCC work are examples of our opportunism.

Again, thanks for the opportunity to comment on this issue that is so vital to County Government and the dependent communities served. We know that you will give consideration to our suggestions.

Respectfully submitted,

Ray E Doerner

Ray E. Doerner, Exec. Dir.

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TELEPHONE 224-3445
AREA 503

February 26, 1979

Mr. Ray Doerner
Rt. 3, Box 1530
Roseburg, Oregon 97470

Dear Ray:

I am following our afternoon meeting of February 21, 1979, with this letter regarding the TPCC completed by the Bureau of Land Management for the Jackson-Klamath Master Unit of the Medford Bureau of Land Management.

The TPCC completed by the BLM for the Jackson-Klamath Master Unit, in my opinion, has the same sort of problems contained in the Josephine Master Unit TPCC on which we did a thorough analysis in 1977. The problems primarily stem from too little time being allowed for accomplishing a detailed analysis. Lands were frequently misclassified as restricted or withdrawn without sound basis.

The reason for the misclassification was usually connected with some former treatment of the land. In some cases, brush had encroached upon a previously logged site. Where this had happened, it was frequently true that trees were established under the brush cover and were missed during the TPCC activities. Other misclassifications into restricted or withdrawn management areas stem from misapplication of the Bureau's own criteria regarding regeneration potential and analysis site indicators. All of the foregoing facts led the Bureau to question it's own work.

It is my understanding the TPCC for the Josephine and Jackson-Klamath Master Units has been disregarded by the Bureau as a land base for calculating the annual allowable cut for the next 19 years. A problem directly related to the TPCC remains. The problem which must be solved is the one associated with a quasi-legal interpretation by Bureau attorneys of a constraint to remain within the limits of the mapped boundaries established during the TPCC process. The final environmental statement for the Jospehine Master Unit on page I-8, allows for digression from the mapped boundaries where specific on-site inspection indicates it is necessary. I believe you should encourage your members to bring all reasonable pressure to bear on the Bureau legal staff and state officers to allow a more reasonable interpretation of the environmental statement.

As you know, we are continuing work on the analysis of the volume table and inventory cruise specifications applied by the BLM in the Medford District. Our morning meeting on February 21, with George Hartman and Don Preston, was extremely helpful. I will be following up on that work within the next week.

Very truly yours,

Glenn Zane

GZ/1

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July 21, 1979

Mr. Ray E. Doerner, Executive Director
Association of O & C Counties
Route 3, Box 1530
Roseburg, Oregon 97470

Dear Ray:

This is in response to your request for my review of the Draft Timber Management Environmental Statement on the BLM Jackson-Klamath Unit. I believe the BLM should be commended for the good job they have done in preparing this EIS. The statement is well organized, adequate alternatives are presented, impact data is readily identifiable and understandable and the text is readable. Many of the tables are excellent.

The BLM does a good job of examining alternatives, including some which would eliminate excess inventory, thus reducing mortality, providing jobs and increasing supplies of needed wood products. After this analysis, it is surprising that the BLM chose a neutral position rather than selecting alternative 3a or 6 (or some variation thereof) as the preferred alternative.

In my opinion, the BLM is not legally required to follow the even flow policy. These scheduling policies have tended to follow those used by the U. S. Forest Service. Nothing in their enabling laws direct them to do that. They seemed to have converted what was originally only a procedure

into a policy. Thus, it seems they could change. There is no requirement to follow Forest Service procedures. The Forest Service itself is allowed by the National Forest Management Act to deviate from even flow when economic, biological or social situations justify it. On June 11, President Carter instructed the Secretaries of Agriculture and the Interior to increase timber supplies by departures from the non-declining flow policy. This instruction should be given serious consideration in the Jackson-Klamath planning unit. The BLM might also consider such action jointly with the National Forests in the area, aimed at achieving national objectives of conservation, price stability, increased employment, etc.

Although the EIS achnowledges projected southwest Oregon timber harvest declines, the essentials of timber demand-supply imbalances the need to be reiterated as background for a decision in this EIS. The 1975 Resources Planning Act Assessment forecast national timber demands 43 percent over present levels by the year 2000. The draft 1980 Assessment forecasts even higher timber demands. It projects demand in 2000 will be 56 percent higher than it is today (Table 1 attached). Both these Assessments predict there will be significant supply shortfalls with resulting high price increases for wood products. All the supply forecasts shown in Table 1 will accentuate supply problems.

The draft EIS shows there will be significant declines in timber harvests in the Medford timbershed during the next

30 years. The Beuter Report predicted a 20 percent decline in supply for the Josephine-Jackson timbershed in the year 2000 (Table 1). Walls' projections approximate Beuter's.

The State Board of Forestry in its "Forestry Program for Oregon" demonstrated that non-declining regional outputs are possible from the Medford timbershed indefinitely, if cooperative actions are taken by state and federal agencies (Table 2). Meeting the program objective would require substantial increases in timber output from the Forest Service and other private sectors. The FPFO shows these owner groups have the capacity to increase output as shown in Table 2. However, thus far the national forest planned harvests have been reduced, even though opportunities exist as on the Jackson-Klamath SYU to increase harvest levels temporarily for a few decades without adverse effect on the sustained yield capacity. In this draft EIS the BLM has presented opportunities to contribute to the national and local needs, but failed to select one of those alternatives. They not only missed a chance to make a contribution but also missed a chance to show federal leadership in land management aimed at desirable economic and social benefits. I suggest that you urge them to rethink their alternative selection process with emphasis on goal-achievement rather than on adherence to strict mathematical procedures disguised as policy.

Table 3 indicates that total private and Forest Service harvests have declined since the early 1970's and

show no signs of increasing. The FPFO studies show that the Forest Service could increase but that forest industry cannot. The three year average harvest since 1974 shows declining harvests. This appears to be all the more reason for BLM to select a reasonable alternative that will utilize excess inventory on the Jackson-Klamath SYU while supporting needed jobs and communities.

In my opinion, the draft EIS fails to characterize the situation in the Jackson-Klamath SYU as an opportunity. This area has a skilled logging and forest industry labor force and the physical wood product plant capacity to capture the benefits of any additional raw material from the Jackson-Klamath SYU. In other words, here is an area that is ready to contribute to national needs for wood products, and in doing so will ameliorate projected local problems of unemployment. A decision to pass up such opportunities as shown for the Jackson-Klamath SYU appears to me to be a bad decision.

Another area for your concern is the economic and employment impacts shown in the EIS. Although the BLM did a good job of analyzing the economic trends I disagree with some of the conclusions, explicit ones as well as implied.

The average current employment figures (7.5 jobs per million) used in Table 2-20 are probably a little conservative but they appear reasonable. Recent Forest Service Input-output studies for the Siskiyou and Rogue River National Forests yielded direct forest industry employment of 10.4 and 6.6

jobs per million board feet, respectively. I seem to discern an attitude expressed in the draft EIS that, since timber supplies from other owners are declining and since labor productivity increases are likely to reduce employment opportunities, then why should the BLM be concerned over a proposed minor reduction in the Jackson-Klamath SYU harvest and why take the opportunity to increase the harvest. Fewer jobs are going to be available anyway. Although the BLM may not intend to give this impression, it does seem to result from the analysis.

16-2 I think the labor productivity increases shown in Table 2-16 over estimate potential improvements. Because of increasing environmental restrictions and trends towards more commercial thinning, logging jobs per million board feet will likely increase, not decrease. Walls' forecasts for improvement in the manufacturing sector are based on continuation of past trends. Although improvements are rather certain to continue, increasingly tight timber supplies and resultant capital constraints will likely limit modernization plans for the next several decades. More complete utilization of total tree may result in new job creation not reflected by past trends. I agree that there is a need to diversify the area's economic base (page 2-72), but goals can be aided by capturing more of the opportunities on the Jackson-Klamath SYU and in the forest industry. Increases in the number of service and trade jobs relative to basic jobs is a national occurrence (page 2-60);

it increases, not decreases, the importance of maintaining and strengthening basic industries such as the forest products sector in the Medford area.

The EIS says the proposal will result in a loss of about 10 short-run local jobs (page 5-4 and Table 3-14). Also, it should state there will be a loss of 250 long-run local jobs (Table 3-14). The statement on page 5-4 is somewhat
16-3 misleading because it compares the loss with the current short-term management strategy. If compared to the 1974-76 base, employment will decline (using their numbers) 250 short-run and 490 long-run jobs.

Table 3-14 does not show any "forest development" (Jackson County) jobs under current management. The BLM should
16-4 re-examine to determine whether there are any jobs like this existing under the current short or long-run management scheme. The Josephine plan included some in the current plan (Table 3-15).

The fourth paragraph of section 3.14.2.1 (page 3-64)
16-5 should be removed or changed. The BLM should consider viable alternatives which will delay economic hardships. Certainly, if workers have a choice of being unemployed now or 10 years from now, most would select later unemployment. The last sentence incorrectly compares seasonal fluctuations to permanent employment declines and should be removed.

16-6 Table 3-15 could be improved if the 1974-76 base average were added. This would illustrate how the projected

timber supply problem is being worsened by declines in planned harvests on public lands. Based on current trends it appears long-term harvest levels may decline more than 30 percent when compared to the 1974-76 base.

In the short time available we were not able to make detailed examination of the actual calculations of harvest schedules in the SIMIX model. Based on a careful reading of this EIS and our prior work with BLM staff, we think they have done a sound job of projecting harvests. As you know, we still have some unresolved questions about the inventory data. This will be reported to you later.

I do want to note for you that the alternatives displayed appear to be easily achievable. This is due to the fact that the near future is likely to bring gains due to a successful genetics program, due to favorable FIR results, and due to lifting of the limitations on the limited-management lands after the trial period. Therefore, alternatives that continue the current level of harvest or increase it to capture excess inventory will not result in declines later as serious as impled in this draft EIS.

Some miscellaneous comments follow. There appears to be an error when comparing sections 8.3a.2.1 (page 8-16) and 8.3b.2.1 (page 3-21). Both percentages should be 64.

Table 1-3 indentifies the proposed land base for the unit. In 1972 the land base excluded the limited-management and low-management lands. My Table 4 shows the changes.

The major shift has occurred in the area managed for timber production, as it has declined 21 percent since 1970.

Table 1-5 summarizes the multiple use tradeoffs proposed. It is a good table but could be improved by showing the economic costs (jobs, etc.) of these tradeoffs. The table might also show why or where the additional 5 million board foot short-term loss occurred.

In summary, I would urge you to request that an alternative be developed and selected that would capture the opportunity to contribute to an amelioration of the projected supply and related problems in the Medford timbershed.

Sincerely,

Carl A. Newport
jf

Carl A. Newport

CAN:jf

Attachments

TABLE 1
Comparison of National Timber Demands with Alternative Supply Forecasts for the Medford Area and BLM Alternatives

	1970	1980	1990	2000	2010	2020
	Demand Projections as Percent of 1970					
1975 RPA National Demand Projections 1/	100	124	134	143	154	163
1980 RPA National Demand Projections 1/	100	-	149	156	171	176
	Supply Projections as Percent of 1970					
Beuter Supply Projections-Medford District	100	100	98	81	99	97
Wall Projections-Medford Timbershed	100	101	99	82	100	98
FPFO-Medford Timbershed		103	100	99	101	103
	Jackson-Klamath Plan Harvests as Percent of 1970					
Alternative 1	100	69	69	69	69	69
BLM Alternative 2	100	83	83	83	83	83
BLM Alternative 3a 2/	100	122	87	87	87	87
BLM Alternative 3b 2/	100	103	103	87	87	87
BLM Alternative 4	100	83	85	91	95	87
BLM Alternative 5	100	97	97	97	97	97

1/ For softwood sawtimber - assumes constant prices.

2/ Does not appear to include the 10 year "trial harvest" of 5 million board feet.

TABLE 2
Projected Harvest by Owner for Medford Timbershed as per Forestry Program for Oregon

Timbershed: Medford

(Millions of Cubic Feet Per Year - Total Stem Volume)

Decade	Program Objective	Projected Harvest by Owner Class						Total All Owners
		Forest Industry	State and Other Public	Other Private	Federal Special	National Forest Standard	BLM Standard	
1970		31	2	6	4	34	43	120
1980	124	17	2	21	4	44	36	124
1990	119	17	2	19	4	41	37	120
2000	119	19	2	18	4	37	39	119
2010	122	19	2	17	3	38	42	121
2020	122	19	3	16	4	38	44	124
2030	122	18	3	15	4	38	44	122
2040	122	21	3	15	4	38	42	123
2050	122	21	3	14	4	37	43	122
2060	123	22	3	14	4	40	41	124
2070	123	22	3	14	4	43	38	124

TABLE 3
Timber Harvests in Jackson County 1965-1977
(thousand board feet)

Year	Private	State	BLM	USFS	Other Public	Total
1965	166,911	2,250	129,122	145,200	-	443,483
1966	209,126	-	135,615	116,200	-	460,941
1967	154,197	-	96,526	180,200	-	430,923
1968	238,881	3,428	132,642	176,779	-	551,730
1969	224,844	-	111,752	115,937	-	452,533
1970	160,789	-	66,437	84,824	1,300	313,350
1971	164,166	257	119,250	144,946	-	428,619
1972	197,508	-	149,549	205,828	2,900	555,785
1973	111,754	2,024	124,251	182,919	-	420,948
1974	262,795	-	81,124	149,112	-	493,031
1975	154,700	-	71,474	97,648	-	323,822
1976	128,276	964	106,426	147,153	3,931	386,750
1977	116,365	41	83,374	139,392	-	339,172

Period Averages

1965-1979	198,791	1,135	121,131	146,863	-	467,922
1970-1974	179,402	456	108,122	153,525	840	442,346
1975-1977	133,114	335	87,091	128,064	1,310	349,915
1965-1977	170,436	642	105,448	142,817	716	420,059

TABLE 4
Comparison of Land Base in
Jackson-Klamath Sustained Yield Unit
(acres)

	1970	1978
Non Forest	17,350	47,610
Non-commercial Forest	139,560	86,100
Timber Production Base	327,270	258,600
CFL Included for Multiple Use Reasons	2,970	3,850
Limited Management Lands	-	44,260
Low Intensity Management Lands	-	47,840
TOTAL	487,150	488,260

Response to comments in Letter 16

16-1 The TPCC is a major criterion in determining the number and location of the inventory plots. Further, it essentially describes the geographic orientation of the ES (see map included with ES).

Revisions in the TPCC are expected as more intensive ground surveys are accomplished. BLM's policy is to remain consistent with the land classification on which the ES is based and to catalog areas where changes will be made in the next inventory. When on site inspection determines a more restricted classification is needed, management actions will be governed by the more restrictive designation. Written instructions governing this have been issued to all western Oregon districts by the State Office.

16-2 See the response to comment 14-2.

16-3 Table 3-14 allows the reader to identify the short-term and long-term impacts of the proposal on direct and total employment, direct and total income, and public revenues. It also allows the reader to compare these impacts with the estimated economic impacts of the 1974-76 harvest level as well as with impacts projected to occur from a continuation of current management. The proposal would have total local (direct plus indirect) employment in 1980 of about 250 less joba than the 1974-76 base. However, this reflects an expected increase in labor productivity between 1974-76 and 1980 as well as a 3-year average annual timber harvest (132 MM bd.ft.) that is higher than the 10-year average annual harvest of (128 MM bd. ft.).

By comparing the 1980 projected harvest under current management with the proposed harvest, it is possible to identify the economic impacts due only to different sustained yield harvest levels. This avoids attributing impacts to the proposal that are caused by external variables such as the decline in labor productivity.

16-4 Between 1974 and 1977 the annual average manpower employed in BLM forest development activities in the Medford district was estimated at less than five full-time-equivalent jobs. About one-half of these occurred in the JKSYUs. Due to rounding of numbers, Table 3-14 indicates no forest development employment. However, the forest development jobs expected to occur in the Medford district under continuation of current management were included with Josephine County (Table 3-15) since most of these jobs were assumed to be related to the Josephine Sustained Yield Unit.

16-5 The economic impacts are of serious concern to the Bureau. The intent of analyzing the alternatives is to indicate to the decisionmakers the impacts of options to the proposal. Alternativea No. 3a, 3b and 5 sre alternativea that would delay economic hardships. The purpose of Chapter 3 is to csndidly sssess the impacts of the proposal. The comparison of permanent employment impacts to the effects of seasonal fluctuation is intended only to put the employment impacts into some perspective.

16-6 This comparison is shown in Table 3-14.

17

Kogap Manufacturing Company

Our goal: Complete forest crop utilization

P.O. BOX 1608 • MEDFORD, OREGON 97501 • (503) 776-6500

July 20, 1979

Oregon State Director
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Re: Draft Environment Statement, Jackson Klamath Unit

Dear Sir:

In view of Executive direction to increase cuts by temporary relaxation of even flow constraint, Alternative 3A is the only viable course of action. The industry is now unstable due to inroads in timber sale offerings on almost every Federal management unit. Panic bidding for timber is the rule and a prolonged recession could bankrupt many purchasers. An increase in BLM offering is not only logical, it is imperative. The Beuter report on the Oregon timber situation indicates that private second growth stands will supply increasing raw material towards the year 2000. Relaxing even flow now will definitely contribute to stability of the timber industry over the next several decades.

17-1 The FIR program in Southern Oregon was specificially instituted to solve regeneration problems plaguing BLM. This program should be considered in your planning and trial cuts in Limited Forest Management Lands should be used to prove or disprove the five year regeneration period requirement. Close cooperation with the FIR program should be planned to take advantage of results that would allow areas now removed from cut calculations to be returned to full management.

KOGAP MANUFACTURING COMPANY

David F. Keiser (sas)

David F. Keiser
Woods Manager

DFK/sas

Response to comments in Letter 17

17-1 See response to comment 15-3.

18

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: M/S 443

JUL 2 9

Murl W. Storms, State Director
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

Dear Mr. Storms:

The Environmental Protection Agency (EPA) has completed its review of your draft environmental statement for the Jackson-Klamath Timber Management Plan. In general this is a good EIS, containing a great deal of detailed and quantitative information. EPA's main concerns with the proposed plan are for potential air quality violations in the Medford-Ashland nonattainment area, and the adequacy of mitigating measures to prevent water quality degradation. In addition, we suggest additional information be provided on the silvicultural classifications and assumptions on which the plan is based. Our detailed comments follow.

18-1 1. The Medford-Ashland Air Quality Maintenance Area (AQMA) has been designated a nonattainment area for suspended particulates and carbon monoxide by EPA, as noted on page 2-4. Under the proposed plan, according to Table 3-1, emissions from slash burning could cause increases in total emissions from all sources of up to 55% for suspended particulates and up to 56% for carbon monoxide. Although impacts on ambient air quality are to be controlled by conforming to the State Smoke Management Plan, the possibility of future violations still exists, expecially for particulates. Impacts are of concern both from the standpoint of the nonattainment area and the allowable increment under Prevention of Significant Deterioration (PSD) guidelines. However, emissions information alone is not sufficient to estimate actual ambient impacts.

Increases in ambient particulate levels must be incorporated into the State Implementation Plan, and compensation provided by reductions in other emission sources. EPA cannot concur with uncompensated

increases in ambient particulate levels, or with increased standards
18-2 violations. Consultation with the Oregon State Department of Environ-
mental Quality on this matter should be documented in the final state-
ment. In addition, the final statement should discuss any measures
18-3 available or being taken by BLM to reduce the amount of slash to
be burned, such as better utilization of wood residues.

2. As documented on page 2-12, many of the streams in the planning
area have severe water quality problems including sediment and
temperature. Aquatic habitat is rated as poor to fair over much of
the area and fisheries in the Rogue River system are declining.
Nevertheless, existing timber sales are planned which will involve
18-4 road building and yarding on unstable soils where there is a strong
possibility for significant increases in stream sedimentation. This
does not appear to be an acceptable trade-off.

3. Impacts on water yield, page 3-9, and sediment increases, page
3-11, are described in terms of annual averages. This is useful
information but does not alone give an accurate picture of potential
impacts. Most sediment increases and peak flow increases will
18-5 be associated with a few major storm events. This variation of
impacts with discharge should be more fully discussed in the final
statement, along with the implications for water quality and aquatic
habitat degradation.

4. The statement on page 3-37 that sediment impacts from roading are
18-6 not as great as those from yarding appears to be contrary to most
published literature and should be explained further or corrected.

5. Soil and water resource impacts from planned road construction in unstable areas, mentioned on page 3-5, are to be controlled by project design features, such as those in Appendix D. We believe that such roads should be relocated if at all possible. In addition, guidelines in Appendix D for the unstable soils mentioned in Table 3-2 call for road construction to be avoided only on slopes greater than 70%. However, slopes of 60% - 70% are generally regarded to have a high hazard for mass wasting, independent of soil stability characteristics (see Water Resources Evaluation for Nonpoint Sources, U.S.F.S./EPA, 1978). Certainly, road construction should be limited to much gentler slopes where soil conditions also contribute to instability.

6. The final statement should discuss, perhaps in Table 1-6,
18-7 available research by Rothacher and others indicating the relationship
between percentage of a watershed cleared of vegetation or compacted

by roads, landings, and skid trails and increases in peak flows
18-7 leading to stream channel damage. Commitment should be made to
keep such disturbance below the levels that would cause signifi-
cant impacts.

7. Studies mentioned on page 3-14 showing that herbicide residues
in streams result primarily from direct applications, often un-
intentional, emphasize the need for adequate buffer strips along
streams to prevent drift. The buffer strips described on page 1-15
for the proposed plan are 100 feet for aerial applications of herbi-
cides. However, the State of Oregon Forest Practices Regulations call
for a 200 foot buffer along Class I streams for aerial herbicide
applications. Section 313 of the Clean Water Act requires that Federal
agencies comply with all State requirements regarding water pollution
18-8 control, both substantive and procedural. The proposed action must
reflect this compliance.

8. Considering the benefits of a 200 foot undisturbed buffer on
Class I streams for fisheries, wildlife, watershed, and recreation,
as indicated on page 1-15, we do not believe that the estimated 0.7
million board foot loss of timber associated with doubling the
proposed 100 foot buffer is an unreasonable trade-off, compared to
the total harvest of 120 million board feet from the planning unit.
18-9 We suggest the final plan provide for a 200 foot undisturbed buffer
or explain why this is an unreasonable trade-off.

9. The discussion of project design features in Section 1.3 should
mention the requirement that forest practices be equivalent or better
18-10 than the practices required by the Oregon Forest Practices Act Regula-
tions. Such reference should be made on pages 1-28 and 1-30, for
example.

10. The economic discussion on page 3-63 should give more attention
18-11 to the potential economic and employment effects on the commercial
fishing industry caused by an overall decline in commercial fisheries
resources to which the proposed action would contribute. We believe
these effects could be significant and they should be evaluated and
considered in the proposed plan.

18-12 11. Potential impacts on domestic water supplies from increased
sediment loads should be evaluated in the final statement.

12. The relationship between the acreage figures in the Timber
Production Capability Classification in Table 1-3 and the figures
in the Timber Management Classes in Table 1-1 is not clear. This
18-13 should be more clearly explained, especially for problem sites from
the TPCC and the limited management lands.

18-14 13. We suggest that more detail be provided on the criteria used to identify "fragile" areas in the TPCC and "limited forest management lands" in the timber management classification. The criteria should include quantitative information relating to soils, slope, etc. Providing this information is necessary to demonstrate that all potential problem areas have in fact been excluded from intensive management.

18-15 14. Additional information on past regeneration success or failure should be provided to support the assumption on page 1-20 that successful plantation establishment within one year of final cut is a reasonable expectation. Reference should be made to the information on page 1-34 concerning past problems and the present need for replanting 13,400 acres. We are concerned that overoptimistic expectations not lead to overcutting, especially in steep, dry, or unstable areas.

18-16 15. The estimated allowable harvest effects from various development practices presented in Table 1-7, particularly vegetation management, should be further substantiated to demonstrate that these are not overly optimistic. Are they based on long term experience or are they largely hypothetical?

18-17 16. What is the reason for the 21% decline in inventoried high intensity lands between 1971 and 1978 as mentioned on page 1-47? Does this represent an actual change in resource conditions or merely a change in inventory methods?

Based on EPA concerns over potential air quality violations in the Medford-Ashland nonattainment area, and the potential for significant adverse impacts on water quality and aquatic habitat from sediment, this environmental statement has been rated ER-2. (ER indicates that EPA has reservations concerning the environmental effects of certain aspects of the proposed action and believes that modifications are required. The 2 rating indicates additional information should be provided to improve the quality of the environmental statement). This rating will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act, as amended.

Thank you for the opportunity to review this environmental statement. If you have questions or would like to discuss these comments, please feel free to contact me or Craig Partridge of my staff at (206) 442-1285 or (FTS) 399-1285.

Sincerely,

Roger K. Mochnick for
Alexandra B. Smith, Chief
Environmental Evaluation Branch

Response to comments in Letter 18

18-1 The goal of the Oregon Smoke Management Plan is to prevent smoke from entering the AQMAs. While this program is not able to prevent all intrusions (due to unpredicted changes in weather conditions), only 1 percent of the 1978 burns in Jackson County produced smoke problems in Medford or Ashland (ODF 1979).

As stated in Section 3.2, most of the emissions would impact areas with little or no population. Since residents and recreationists have come to expect higher air quality in these areas than in the urban portion of the planning area, smoke would unfavorably affect the visual resource and recreation experience in the short term (see Section 3.9.4).

18-2 Consultation with Dennis Bellsky, ODEQ, indicated that no significant impacts to the Medford-Ashland AQMA would be likely to result from slash burning (if conducted under ODF Smoke Management Plan). This conclusion was based upon the data in Table 3-1 (air quality impact section) and Annual Report, Oregon Smoke Management Plan for 1978.

18-3 The Medford District has reduced the amount of slash burning by issuing permits for firewood for personal use and by increasing the use of gross yarding to reduce slash hazards and aid reforestation work. These reductions are incorporated into the proposed action. A BLM plan to increase salvage sales of western red cedar and utilization of timber residues has been reviewed by the public and will be released with revisions soon. Although slash reduction is not the main goal of the plan, the amount of slash to be burned will be reduced. Quantification is not possible.

18-4 Much of the sedimentation, excessive debris and streambed erosion damage to streams in the planning area has resulted from logging and road building activity on non-Federal lands.

Road construction on BLM-administered lands, especially on unstable soils, is carefully planned, designed and regulated (See Appendix D). Yarding activity is also carefully planned and regulated via timber sale contract stipulations and contract administration. When these are combined with undistrubed buffer strips (which act as sediment and debris filters), sedimentation is held to a minimum.

18-5 See changes in text in Section 3.4.2.3.

18-6 Section 3.6.3 Fish has been rewritten and the text has been clarified.

18-7 Since BLM administers a relatively small percentage of the area, application of research (such as Rothacher's) based on studies of entire watersheds is not possible. Cumulative effects of landowners/administrators other than BLM cannot be assessed due to insufficient information.

18-8 The pertinent Oregon Forest Practice Rule is Oregon Administrative Regulations (OAR) 629-24-203, which involves protection of waterways and open water. The regulation provides that, for aerial applications of 2,4,5-T and silvex only, a 200-foot unsprayed area shall be left between Class I streams and spray application. For other herbicides, the minimum buffer shall be "one swath" in width for aerial applications. Since BLM has discontinued use of both 2,4,5-T and silvex, the BLM buffer widths listed on page 1-15 of the DES appear to be consistent with State requirements. A statement that BLM forest management practices meet or exceed objectives of the statewide water quality management plan has been added to Section 1.5.2.1, State Government, and the Memorandum of Agreement with the State has been further explained.

18-9 Multiple use analysis in the MFP process has resulted in a recommendation of an average 100-foot buffer zone which would provide adequate shade to maintain wster temperatures, reasonably maintain the riparian habitst for wildlife and not appreciably diminish the visual setting for recreationists.

18-10 A reference that Bureau minimum standards meet or exceed state rules is included in Section 1.5.2.1 (under State Government). The BLM and USFS, acting jointly, have entered into a Memorandum of Understanding with the State Forester in this regard.

18-11 The economic impacts on the commercial fishing industry are a function of the specific impacts on the habitat of commercial fish species. Since the specific impacts on habitat could not be quantified, neither could the economic impacts. Overall, however, the effects on habitat are expected to be insignificant. The fish habitat on public lands in the JKSYUs can be linked to the generation of a relatively small amount of personal income from commercial fishing (approximately $22,000 annually).

18-12 See response to comment 2-2. There is potential impact from sediment if homeowners downstream from a logging sale withdraw surface water from streams for domestic use. Planned sales in areas of known sediment problems have been identified in Section 3.4.2.1. During site specific project planning, authorized water diversions are identified and the impacts of the project addressed in the Environmental Assessment (Section 1.5.3).

18-13 Table 1-3 shows the classifications from TPCC prior to consideration of any multiple use conflicts. Conflicts and proposed tradeoffs for high intensity lands only are explained in Table 1-6 and summarized in Table 1-5. The proposed sustained yield allowable cut was computed on the resulting base of 258,597 acres as shown in Table 1-1.

Low intensity management lands (47,840 acres) are included in the 92,100 acres shown in Table 1-3 aa commercial forest lands excluded from the base. It is on 4,900 acrea of these low intensity lands that a trial harvest program is proposed to meet the objectives ahown in Section 1.2.1.2.

Limited management lsnds (see Section 1.2.1.2) constitute the remainder of commercial forest land excluded from the base as shown in Tsble 1-3.

18-14 Detailed site specific TPCC data are available for review in the Medford District office.

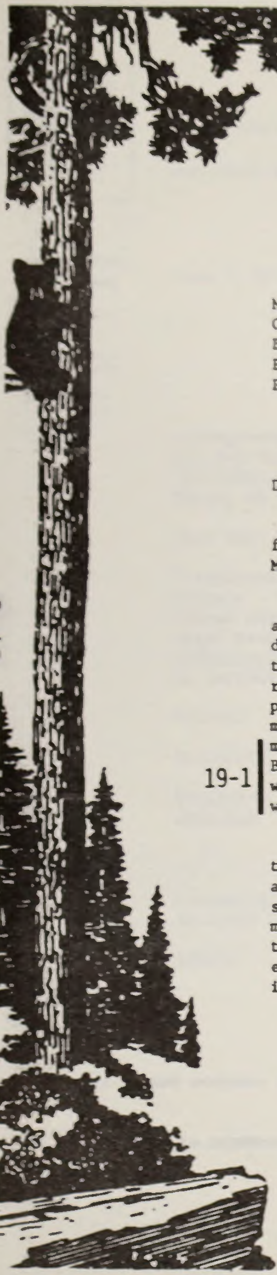
18-15 The adjacent Rogue River and Siskiyou National Forests have been underplanting following the regeneration cut of a two-atage shelterwood system for 6 to 7 years with significant success. Limited Medford District experience during the past 3 years shows similar success. Analysis of these data is the basis for the proposed decision to underplant. Final harvest cut of the Shelterwood system would not take place until regeneration is established.

Steep, dry and unstable soil areas would be excluded through TPCC. Only the higher site areas would be clearcut. It is these areas which have demonstrated the capability to be successfully replanted after clearcut harvest. See also response to comments 1-2 and 14-1.

The need for replanting and interplanting 12,200 acres of high intensity land and 1,200 acres of low intensity land is based on three factors: (1) Reforestation success is higher on high intensity landa. Research and experience also indicates a higher rate of success when reforestation efforts are completed promptly after harvest. (2) Any plantation can have areas which do not attain adequate stocking levels throughout and therefore require replanting or interplanting. (3) Some damage or mortality would occur during the shelterwood final harvest cut which constitutes a portion of the 13,400 acres.

18-16 See response to comment 12-4.

18-17 High intensity lands in the 1978 inventory are much more stringently defined and located in place than was the case in 1971 (see response to comment 1-2 for details).



19

SOUTHERN OREGON RESOURCES ALLIANCE
P.O. Box 1273
Grants Pass, Oregon 97526
479-4803 or 476-7415

July 20, 1979

Mr. Murl Storms
Oregon State Director
Bureau of Land Management
P.O. Box 2965
Portland, OR 97208

Re: Jackson-Klamath Draft
Timber Management Plan

Dear Mr. Storms:

Our Timber Committee has directed me to make the following comments on the Jackson-Klamath Draft Timber Management Plan.

19-1 1.) With timberland withdrawals taking place all around us as a result of congressional wilderness designations and RARE II studies; it is discouraging, to day the least, to see BLM plan further land base reductions on this unit. We urge, in the strongest possible terms, the rapid development of the experimental program on the so-called "low intensity management lands" and a most attentive review of the Mason, Bruce and Girard studies relative to land withdrawals which may not be justified under the TPCC process on which they were based.

2.) Industry is so severely impacted now that in testimony on RARE II for Senator Hatfield on July 6th, a local small mill operator (Ron Webb of Webco Lumber) stated that his company is currently hauling logs 250 miles to process. That single example appears to us to indicate that industry has, and <u>is</u> making enormous efforts to maintain their timber handling capabilities in a <u>very</u> unstable setting.

Mr. Murl Storms
July 20, 1979
Page 2

Re: Jackson-Klamath Draft Timber
Management Plan

Therefore we urge you to adopt Alternative 3-A as an immediate response to meeting need. Studies and experimentation currently underway should help us all to meet future needs based on the next ten years experience.

Thank you for your consideration.

Sincerely,

Anne G. Basker

Anne G. Basker
Director

<u>Timber Committee</u>

Buck Mehl
Larry Brown
Don Johnson
Lew Krauss
Jim Peckham
Lorne Swearingen

AGB:cae

Response to comments in Letter 19

19-1 See response to comment 16-1.

Executive Department

INTERGOVERNMENTAL RELATIONS DIVISION

ROOM 306, STATE LIBRARY BLDG., SALEM, OREGON 97310

VICTOR ATIYEH
GOVERNOR

July 23, 1979

State Director
Oregon State Director (911.1)
Bureau of Land Management
P.O. Box 2965
Portland, OR. 97208

TIMBER MANAGEMENT JACKSON-KLAMATH AREA
PNRS 7905 4 1330

Thank you for submitting your draft Environmental Impact Statement for State of Oregon review and comment.

Your draft was referred to the appropriate state agencies. The Division-State Lands and Fish and Wildlife offered the enclosed comments which should be addressed in preparation of your final Environmental Impact Statement.

We will expect to receive copies of the final statements as required by Council of Environmental Quality Guidelines.

Kay L. Wilcox
KAY WILCOX, A-95 Coordinator

KW:cb
Enclosures

AN EQUAL OPPORTUNITY EMPLOYER

Division of State Lands

1445 STATE STREET, SALEM, OREGON 97310 PHONE 378-3805

June 7, 1979

7905
4
1330

Intergovernmental Relations Division
Ms. Kay Wilcox
306 State Library Building
Salem, OR 97310

Dear Kay:

I received a copy of the BLM DEIS - Timber Management, Jackson - Klamath Units from State Forestry. No A-95 number shows and no response form was attached. Brief review indicates a lack of concern by BLM with archeological resources and rare plants, but otherwise no serious problems from our agency.

Thanks.

Sincerely,

WILLIAM S. COX
Director

Leonard G. Wilkerson
Minerals Leasing Specialist

LGW:tt

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
306 State Library Building, Salem, Oregon, 97310
Phone Number: 378-3732

PNRS STATE REVIEW

Project #: 7905 4 1330 Return Date: JUL 26 1979

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

If you cannot respond by the above return date, please call to arrange an extension at least one week prior to the review date.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

( ) This project has no significant environmental impact.

(X) The environmental impact is adequately described.

( ) We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement.

( ) No comment.

Jackson/Klamath Draft timber EIS

Remarks

Agency SHPO By David G. Talbot

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
306 State Library Building, Salem, Oregon, 97310
Phone Number: 378-3732

PNRS STATE REVIEW

7/13

Project #: 7905 4 1330 Return Date: JUL 26 1979

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

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ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

( ) This project has no significant environmental impact.

( ) The environmental impact is adequately described.

(X) We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement.

( ) No comment.

Remarks

Comments are attached.

Agency Fish & Wildlife By [illegible]
ENVIRONMENTAL MANAGEMENT SECTION 7/18/79

OREGON DEPARTMENT OF FISH AND WILDLIFE
comments
BUREAU OF LAND MANAGEMENT
JACKSON-KLAMATH SUSTAINED YIELD UNITS

Draft Timber Management Plan
PNRS 7905-4-1330

The proposed timber management plan discussed in the Draft Environmental Impact Statement (DEIS) appears to be generally acceptable. However, our field biologists in the area are concerned about some aspects of the statement that could impact fish and wildlife.

20-1 The DEIS indicates that with the worst case analysis (page 8-6), a total of 12,945 tons of sediment could be deposited in the streams of the Jackson and Klamath Sustained Yield Units (JKSYUs). The statement recognized that this material could be detrimental to an individual stream, but would be insignificant to the JKSYUs as a whole. We contend that the cumulative effect of this sediment could have a significant negative impact on the streams of the entire area.

Approximately 375 miles of new road construction is planned during the 10-year period. Additionally, an estimated 100 miles of road will be reconstructed during the same period. This construction/reconstruction activity could result in higher than anticipated sediment deposition in associated streams. This concern may be especially applicable to areas like the West Fork Evans Creek, which has a history of sedimentation problems. Road construction in these unusually vulnerable areas should be minimized and special logging techniques employed to prevent any additional sediment problems.

20-2 The statement should address road closures, particularly on deer and elk winter ranges. Roads within this critical habitat will increase public access often resulting in unnecessary harassment of wintering animals. Roads constructed in winter range areas should be eliminated or physically blocked following harvest operations.

The DEIS specifically identifies timber sales that could potentially increase stream sediment loads. Important fishery waters could be negatively impacted by the presence of additional silt. These sales should be reevaluated, modified or eliminated for the protection of the instream habitat.

20-3 A significant portion of the JKSYUs is planned for two-stage shelterwood cutting. The standards applied to the size and shape of a clearcut should also apply to this harvest method. Large shelterwood cuts could have the same negative impacts on wildlife as a large clearcut. The width of the shelterwood cut should not exceed one-fourth mile. The harvest area boundary should attempt to follow natural contours. The creation of large openings should be avoided, especially on big game winter ranges.

Timber sales should be planned to preserve a timbered buffer between cut-over areas on different ownerships. Land uses on adjacent private lands must be considered to avoid conflicts and creating excessively large openings which is undesirable to many forms of wildlife, including big game.

20-4 Snags provide important habitat for raptors and cavity-nesting birds, as well as some other wildlife. Large cull trees should be left standing where possible so there will be snags available for the next 10-40 years. This is especially important in recently logged areas.

20-5 The application of herbicides within this area could cause some concern. Monitoring of waters following application of herbicides should consist of more than the random "grab" sample technique. This type of sampling could inadvertently miss localized high concentrations of chemical in the streams. A more reliable monitoring system should be explored.

cc: Southwest Region
Bill Haight
Rick Werner
John Fortune
Central Region
Paul Ingram

Response to comments in Letter 20

20-1 The reference cited (page 8-6) is for Alternative No. 1. The proposed action would increase sediment yield approximately 15,650 tons. This is about a 1.5 percent increase over present sediment yields of the JKSYUs. While this is an insignificant increase to the systems as a whole, localized impacts have been discussed in Sections 3.4.2.3 and 3.6.3.

20-2 Section 3.6.2.3 has been changed.

20-3 Section 3.6.2.1 has been expanded to reflect these impacts.

20-4 See response to comment 5-2.

20-5 The water monitoring system is designed to take samples when herbicide residues are most likely to be detected and to verify the effectiveness of application techniques in minimizing herbicide entry into streams. In this respect, the sample is not considered random. Localized high concentrations of herbicide are a special case not normally experienced in the operational application of forest herbicides. If evidence exists to show that this situation may occur, the Bureau would indeed require more intensive samplings.

SOUTHERN OREGON
TIMBER INDUSTRIES ASSOCIATION

2680 N. PACIFIC HWY. MEDFORD, OREGON 97501 TELEPHONE 773-5329

July 19, 1979

Oregon State Director
Bureau of Land Management
P. O. Box 2965
Portland, OR 97208

Re: Comments on Draft Timber Management Environmental Statement: Jackson-Klamath Sustained Yield Units

Dear Sir:

The Timber Committee of the Southern Oregon Timber Industries Association named a special subcommittee for the purpose of reviewing the Jackson-Klamath EIS. The following comments result from that cooperative effort to provide constructive response.

Alternative No. 3A provides a far superior action proposal than that submitted in the "proposed action." Recent directives by President Carter give even greater credence to the merits of Alternative No. 3A.

21-1 We see very little difference in environmental impacts between this alternative and the proposed action. We cannot agree that Alternative No. 3A would contribute to the overall instability of the industry as stated on page 8-20. The statement reveals misunderstanding of the realities within our industry, and fails to acknowledge need for offsetting timber harvest volume reductions on the Josephine Unit and Siskiyou National Forest. The total supply picture is that to which the industry must adjust.

Specific Comments

21-2 Page 1-2: A total of 4,900 acres of low intensity lands are listed for regeneration cutting. Only 2,450 acres are scheduled for planting. It seems to us that all acres scheduled for regeneration cutting should be slated for planting.

21-3 Also on this page, limited management lands are not scheduled for any management. An experimental program involving at least enough acres to support an annual cut of 1MM feet should be scheduled for these lands. This schedule should be tied in with the F.I.R. program as well as the program on low intensity management lands.

21-4 Page 1-4: Under Harvesting Limitation -- Clearcutting should be used only where "It is determined to be silviculturally desirable" -- rather than "essential."

Page 1-7: This chart should be changed to add an Operations Inventory, a Trial Harvest Program and an Annual Trial of 1MM board feet under Limited Management Lands.

Page 1-10: Under Limited Forest Management Lands the statement is made that "Regeneration time, if these lands were logged would be considerably in excess of five years and successful reforestation would be uncertain." A trial harvest program under F.I.R. would test the validity of this statement, as well as the referral to "probable site degredation" in the next paragraph.

Page 1-14: We question the necessity of allowing no timber harvest in stream buffers. Such areas can be managed to protect streams sides and water quality and still allow utilization of other resources.

21-5 Page 1-16: It is not clear if any Peregrine Falcons utilize the Peregrine Falcon habitat in the Klamath River Canyon.

Page 1-17: VRM Class II lands should be reviewed to make sure all lands classified as such deserve the classification.

21-6 Page 1-28: Scope of Treatment -- We question basing a regeneration cut on removal on 30-60 percent of basal area. The main concern of the shelterwood system is to leave enough well distributed trees per acre to provide protection for the planted seedlings. Basal area would seem to be a poor indicator. Shelterwood trees have to be removed after a few years so some consideration should be given to this when selecting leave trees.

21-7 Page 1-29: Second Paragraph. Reforestation of low intensity lands should not depend on natural seeding. These lands should be planted, natural seeding is to uncertain.

21-8 Page 1-42: LCDC Goal VII Discussion. This statement regarding protection of hazard areas is not clear.

21-9 Page 2-54, Line 7: Medford is not a center of paper manufacturing, maybe this should have been plywood.

Page 5-3, Paragraph 8: We question whether the reduction of pocket gophers on 9,000 acres would be an adverse impact.

Page 5-4, Wilderness: Any lands suitable for wilderness classification are being currently studied under BLM program.

Page 7-1: Irreversible and Irretrievable Commitment of Resources. This section should be rewritten with emphasis on actual irreversible and irretrievable commitment of resources and not just possible detrimental impacts of land management decisions.

We appreciate the opportunity to comment on your planning documents and hope that your final action will take advantage of every opportunity for allowable management of resources needed by all Amercian citizens.

Sincerely,

Martin Craine
Secretary-Manager

MC:lb

Response to comments in Letter 21

21-1 Refer to changes in the text in Section 8.3a.12 and response to comment 14-5.

21-2 See response to comment 14-1.

21-3 See response to comment 15-3.

21-4 See response to comment 15-4.

21-5 See Section 2.8.3.

21-6 See response to comment 15-6.

21-7 See response to 14-1.

21-8 See response to comment 15-8.

21-9 The text in Section 2.17 has been revised.

WESTERN FOREST INDUSTRIES ASSOCIATION
1500 S. W. TAYLOR STREET · PORTLAND, OREGON 97205
TELEPHONE
503-224-5455

July 16, 1979

Mr. Murl Storms
State Director
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

Dear Murl:

We urge the adoption of the alternative which eliminates the excess timber inventory in the shortest possible time or not more than ten years (No. 3-A). This option provides a partial answer to the timber supply gap this nation faces in the immediate future. It also provides the best hope to alleviate community stability problems in Southern Oregon and provides the broadest economic and social benefits.

However, we must again emphasize that the key to responsible land management in Southwestern Oregon lies not with placing timberland in "limited" or "low intensity" categories, but in solving the reforestation problems of the region. Therein lies the answer to many questions about timber harvest levels.

We again urge you to form a "Citizens Reforestation Committee" for each Master Unit. The function of the committee will be to monitor reforestation efforts on public land. It should consist of County, State and Federal officials, concerned citizens as well as industrial foresters competent to judge whether or not reforestation is being accomplished in a competent manner.

Very truly yours,

Joseph W. McCracken

Joseph W. McCracken
Executive Vice President

Response to comments in Letter 22

No response necessary.

23

SOUTHERN OREGON CITIZENS AGAINST TOXIC SPRAYS
JACKSON - KLAMATH COUNTY CHAPTER
3434 N. Valley View Rd.
Ashland, Ore. 97520

Oregon State Director (911.1)
Bureau of Land Management
P.O. Box 2965
Portland, Ore. 97208

Dear Sir:

As a representative for Jackson and Klamath counties chapter of SOCATS, I am pleased to submit the following partial response to the DRAFT TIMBER MANAGEMENT ENVIRONMENTAL STATEMENT, JACKSON - KLAMATH, Ore. I would like to comment in more detail, but am limited by the deadline and only became aware of the statement 2 weeks ago.

We strongly urge the implementation of Alternative One with the following amendments to be made to that alternative:

23-1 P. 8-1 states that " no attempt would be made to control grass, brush, or hardwood species growing in competition ." Since it is doubtful that this would be an acceptable alternative to timber producing interests we suggest the inclusion of manual release methods on sites where demonstrable stunting of unit growth is shown. Site preparation at planting time might include grass removal with a hoedad and/or mulching with a paper cone or disc. Also if trees are planted in biodegradable containers instead of bare roots, they will suffer less shock and vegetation competition will have correspondingly less affect on seedlings.

Since the BLM is required to do multiuse management as well as sustained yield , in at least one aspect of forest management, two interests could be served at once. A local BLM receptionist estimated that 2-3 people come in to the office daily requesting wood cutting permits. They are denied on the grounds that it is fire season. Yet, loggers are out there cutting now. If they are granted special permits, an avenue must also be opened to private citizens to do the same, many of whom would be able to run their own small firewood selling businesses to meet the increasing demand for that forest product. These firewood harvesters could remove competeting hardwood growth from selected regeneration sites at no cost to the BLM other than supervisory salaries.

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23-2 Another objection to Alternative One is the planned use of strycnine poison bait for gopher control on 6,850 acres. If wild brush and grasses are not poisoned with herbicides, the gophers will have other food besides the seedlings and tree damage would be minimized. Furthermore, if more single tree and shelterwood harvesting were to replace present clear-cutting methods the gopher problem would not arise. P.3-34 suggests gophers may serve to promote beneficial fungi which aid tree health and immunity.

(2)

23-3 Mention is not made of the herbicide impact on bees. Although bees may not be directly killed by the spraying, the sprays are likely to be carried to the hives where the eggs will be caused to produce mutants, inferior offspring or be destroyed completely. It is generally known that agribusiness is running out of bees because they have all been poisoned. Studies have shown that a 30% decrease in bee population exists in some areas. Our immediate survival is directly related to plant pollination by bees. Any activity which further threatens bee population should not be conducted. Many rural residents keep bees that forage up to three miles from their homes. For that reason, homes should be given a three mile buffer zone if any spraying is implemented.

23-4 Mention is made p. 3-57 that label instructions for atrazine require the removal of cattle for one year after application. This must mean that the chemical persists for that long. I see no reference to guidelines for reentry being established for forest workers. Herbicides are absorbed through the skin and nose via vaporization in warm weather. Workers should not be allowed to enter areas until such a time when the chemicals have degraded and no longer are detected by testing on vegetation or in soil.

23-5 2,4, D is a known carcinogen, yet it is schedualed for use in areas of documented endangered species. P. 2-23 indicates spotted owl confirmed location habitat, as well as siskiyou Mtn. salamander confirmed habitat. Roundup and Atrazine are also slated for heavy use there. This is unacceptable protection of these species. As drift and bioaccumulation makes accurate predictions of herbicide buildup impossible, these areas should be deleted from the spray program. Referral to spotted owls on page 7-1 mentions that 14 pairs of this bird (on the endangered species list) occupy high intensity forest lands and that these owls are in jeopardy. The logging of this area is in conflict with the congressional laws requiring protection of endangered

23-6 species. The selection of 8 pairs of owls for protection is a weak gesture. If the bird is already endangered how can the further elimination of 2/3 (from the total of 23 pairs in the county) of their population be considered acceptable?

We would like to see more maps showing the habitat area of other species listed on the endangered and threatened lists to compare with proposed logging activities.

We are especially concerned about human exposure to herbicides. High use recreation areas are mentioned pp.2-36 through 2-40. P.2-36 says "Fig. 1-1 shows the location of this trail"(ref. to the Pacific Crest National Senic Trail). I could find no fig. 1-1. But fig. 2-37 looks as though this trail is represented by a dotted line, although it is not identified in the key. When comparisons are made with the foldout map fig. A 1 (herbicide application) one notices that no less than five of the designated spray areas coincide with or come extremely

23-7 close to this trail. Is this trail to be posted to warn hikers? What is a hiker to do if confronted with a sign? Turn back 20 or more miles on foot? This is a grave oversight. This is a long established trail of high recreational use. Its standing has priority over logging interests and should be allowed a minimum of 500 ft. buffer zone as applied to dwellings since hikers forage and camp as they hike.

23-7 Anderson Butte is also marked on map 2-8 and I can testify from my own visits there that it recieves considerable recreational use. Three target spray areas coincide with this area. Direct spraying of recreationists is totally unacceptable. The road and any trails should be posted at least a week before spraying and notice of the spray activities should remain until monitoring shows no residue remains on vegetation or in the soil.

23-8 P. 3-71 refers to the human health impact. After saying that exposure to humans could be direct (with herbicides) the ES says "research has shown that the chemicals proposed for use are relatively nontoxic to humans." This statement is misleading. What "research" does this statement refer to? These chemicals are tested on rats and laboratory animals, their impact on humans is guesswork.

Dr. Samuel Epstein, M.D. former cheif of the Laboratories of Environmental Toxicology and Carcinogenesis at the Childrens Cancer Research Foundation in Boston, Mass. has been quoted as follows: " 2,4,D and 2,4,5-T are terotogenic as well as their dioxin contaminants. ..... It should be emphasized that no major known human terotogen such as X-rays, German measles, mercury or thalidomide has ever been identified by epidemiological analysis, even in industrialized countries with highly evolved and sophisticated medical facilities."

Further, quoting from "The Other Face of 2,4,D" published in Canada "studies by Dr. Diane Courney,Chief Toxicologist for the EPA (U.S.) ... revealed that low doses of 2,4,D for a long period of time causes more fetal damage than large doses. We are quoting a yet unpublished H,E,W report covering 79,000 animals which shows that the dioxin is not responsible for the birth deformities, that this is caused by the chlorophenols themselves....They (Canadian official Dr. W.P. McKinley's group) found that even 2,4,d was producing more birth deformities at lower doses than 2,4,5-T."

Studies on some herbicides have shown primates to be as much as 100 times more sensitive than rats to the same dosages per body weight. Have studies been done on primates with 2,4,-D, Dalapon, & Atrazine?

The EPA cannot be relied upon to conclusively show safety of the chemicals it registers. The General Accounting Office (hereforward the GAO) report of Dec. 1975 found some of the following descrepancies between EPA regulations and their enforcement;

1) In a sample of 36 chemicals within 100 product files GAO inspected, 64% of the chemicals randomly inspected had NO DATA SUBMITTED for mutagenicity. When and if a registrant is notified by the EPA that an active ingrediant lacks one or more long term tests, the registrant is given the necessary 2 to 3 years to complete studies. During which time the product recieves a temporary registration for use.
2) Safety data has never been submitted for many chemicals.
3) EPA for the most part requires safety testing only for individual active ingrediants and not for pesticides as marketed which usually contain several ingredients. Many times pesticides in combination generate effects on animals and plants different from their effects in isolation.
4) The absence of required data is illustrated in the case of 2,4,-D An EPA environmental chemistry review of this pesticide completed

in 1973 showed that several studies were lacking or inadequate including:

- -a microbiology study under anaerobic conditions
- -photochemical degradation study with lake water
- -leaching, absorption & runoff studies for ditch banks
- -absorption studies with hydrosoil (mud)

Yet these and other chemicals are given registration numbers and their use continues.

For the BLM to rest upon the EPA for safety assurances is passing the buck. " The Supreme Court of the State of Washington No.44542 Aug. 1977 found a helicopter co. liable for damage to a private. The decision rested on a determination that liability should be imposed on the basis of strict liability, rather than negligence. This means that the judge determined that whether or not the co. was negligent in the conduct of spraying was immaterial, that they are liable for damages they caused because crop spraying is a particularly dangerous occupation. The same standards should be applied to crop dusting as to dynamite blasting. " CATS Newsletter Vol. 2#3 1978.

Anyone handling or promoting the use of dangerous chemicals is responsible, morally and probably legally.

Results of the Stream Monitoring Program conducted during FY 1977 Herbicide Spray Project, by John J Cameron and John W. Anderson, US Dept. of the Interior, BLM Management, Coos Bay District Office, 333 South Fourth St. Coos Bay, Ore. 97420.

The monitoring program which the authors conducted utilized 3M Corporation's Dual Copy Paper #209 to record overspray, and one gallon plastic bottles supplied by the lab services division in Salem, Ore.

"...with all the precautions that were taken, contamination of the stream systems and violation of buffer strips still occurred."

"The results have demonstrated that aerially applied herbicides do, indeed, enter the stream system, whether as a result of direct spray, or overspray, drift, leaching, or runoff during heavy rains."

"... with aerial application the chances of these herbicides ultimately entering the stream system is approximately 70%."

" The potential of nontarget organisms being exposed to aerially applied chemicals is considerably high."

Quotations from above report.

"The lack of research data on the base of the food pyramid makes it impossible for field personnel involved in these projects to even remotely understand the overall impact of herbicides on aquatic communities where contamination occurs."

"The data collected during the monitoring procedures shows that the management practice of utilizing aerial application of herbicides may indeed pose a threat to environmental quality and therefore the next step should be to modify these practices as required."

Any agency, gov't or private, occupied with the release of herbicide

and pesticide poisons is in essence conducting a dangeroua experimant upon unwilling subjacts. Even now, numerous citizens are in court sueing gov't agencies, chemical companias and helicopter companias for millions of dollars of damages including involuntary manslaughter (infant death due to herbicide poisoning).

23-9 Surely some type of indamnity insurance will be necessary soon for chemical release into the environment - skyrocketing the cost of chemical management programs. Also, we wondar if the aconomic analysis for thesa programs includes the cost of monitoring programs. We wonder if the taxpayers wish to subsidize this endeavor.

We hope this report amphasizes the sariousneas with which this issue must be addressed, and that youwill not traat tha responsibility given to you by your job lightly. In tha past, slight citizen response to this issue reflects ignorance rathar than lack of concarn. A growing informed public is alarmed and saeks audiance and information.

23-10 As thia papar is offered by the group indicated by the enclosed petition, I request that it be reproduced in its entirety in the final Jackson - Klamath Timber Management Environmantal Statemant, along with mention of the number of signatures anclosed,(which ware collected in six days only).

Sincerely,

Diane Lieberman

Diane Lieberman

cc: Cecil Andrus
Sen. Jamea Weavar
George Francis, Medford District BLM

Response to comments in Letter 23

23-1 See response to comment 12-15.

23-2 Most of the acreage planned for gopher poisoning are areas that previously supported forests, but becsuse of psst events, such as clearcutting and wildfire, are currently poorly stocked with conifers. Pocket gophers and frost seem to be the most important items affecting seedling survival and growth (Williamson and Minore 1978). Gophers prefer forbs and grasses over woody plants as a food supply. Experience has shown that removal of these preferred foods, combined with poisoning, is the most effective method of reducing gopher populations. While some gopher problems can occur in areas harvested by the shelterwood system, clear-cutting causes the most problems. Therefore, this method is not employed in areas of potential gopher infestations.

23-3 The impact on bees has been recognized in BLM's FES Vegetation Management with Herbicides (1978). These impacts are taken into consideration when spraying plans are developed.

23-4 EPA has not identified any need for forest worker re-entry guidelines on any herbicide proposed for use by BLM. Should EPA identify or specify any requirements, BLM will abide by them. BLM now has a policy to identify those areas that have been treated with herbicides within tbe last 2 years in contracts for forest development work.

23-5 The Siskiyou Mountain salamander is not an endangered species. Additional information on the possible effects of 2,4-D on birds has been added to Sections 3.6.2.4 and 3.6.5.

23-6 The Northern Spotted owl is not listed by the Federal Government as a threatened or endangered species. It has been administratively listed by the Oregon Fish and Wildlife Commission as threatened.
The State of Oregon is a participant in the Oregon Endangered Species Task Force which feels the species will receive adequate protection under the guidelines established.

23-7 Designated spray areas would be posted 15 days prior to spraying, stating what herbicide and carrier are to be applied, when they would be applied, and the reason for the application. Spraying proposed within developed recreation sites would be scheduled for early spring or late fall when use is minimal. In accordance with BLM policy (43 CFR Part 6250.0-6) "lands, roads, and trails may be reatricted to specified authorized use or no use in the interest of public health and safety...." Section 3.16 has been rewritten to further examine impacts to human health. Section 4.2 identifiea a measure to mitigate impacts of herbicide application along the Pacific Crest Trail on social conditions and human health.

23-8 See changes in Section 3.16 which reflect more recent findings on 2,4-D.

23-9 The costs of monitoring herbicide treatments are included in the estimated annual funding to implement the timber management program for the Jackson and Klamath SYUs (See Chapter 7). The administrative costs for herbicide site preparation and herbicide release include project planning, field visit, contract administration, records, water monitoring, project area monitoring and environmental analysis.

23-10 Enclosed with this letter was a petition with 454 signatures. The statement to which those persons had signed was as follows:

> We the undersigned residents of Jackson and Klamath counties protest the planned release of all herbicides and other pest control chemicals on public lands.
>
> Past assurances of safety of the chemicals and of application methods have proved unreliable. Laboratory testing does indicate hazard; for some of the chemicals in the proposed program, adequate testing has not even been done.
>
> It is an insult to life to carry out programs of questionable risk to health because of an assumed increased timber yield. Not only is this assumption scientifically unsubstantiated, but there is evidence that herbicides damage conifers and interfere with vital ecological processes and interrelationships.
>
> Our group is presenting further detailed comments on the JKSYU management plan which we expect will be duly considered and acted upon.

The petition is on file in the Oregon State Office, BLM.

SOUTHERN OREGON
TIMBER INDUSTRIES ASSOCIATION
2680 N. PACIFIC HWY. MEDFORD, OREGON 97501 TELEPHONE 773-5329

July 23, 1979

Oregon State Director
Bureau of Land Management
P. O. Box 2965
Portland, OR 97208

Dear Sir:

I have read the Draft EIS for the Jackson-Klamath Master Unit and desire to register some comments.

I prefer your alternative 3A which permits utilization of surplus inventory. Until recently your agency and the Forest Service have been artificially constrained by policy direction requiring non declining even flow harvest scheduling. This is a rigid, dogmatic and unrealistic approach to management of a public resource. Recent moves by President Carter have opened the door for both agencies to exercize their obligations as responsible land managers. I refer specifically to the President's direction on the departure from non declining even flow scheduling. Your 7/79 BLM News Clips reported this and noted that this master unit would be among the first to which the new policy would be applied. It is a likely candidate.

From a scheduling or regulation viewpoint you have an undesirable age class distribution. There is excessive amounts of old growth timber in the 200 year and older categories. The annual growth, by your own admittal, is low to non existant and there are significant losses occurring due to mortality, insects and disease. Furthermore, the stands are low insurance risks from a fire standpoint. You present a very convincing argument for accelerated conversion of this excess inventory on page 1-22 of the DEIS. Failure
24-1 to do so will result in loss of between 410 MMBF (Alt3A) and 320 MMBF (Alt3B) of timber to the elements. This is intolerable and might even be considered gross mismanagement of the resource.

The Southern Oregon Timber Industries Association has been trying to point out to the Medford District staff that there is excess volume out in the woods being lost to decay which could be recovered. We have repeatedly been informed that this material does not exist and any recovery would be at the cost of green volume being replaced by salvage volume in the annual harvest program. The information in the DEIS concerning excess inventory and the relationship of it's harvest to the long run sustained yield level of 120 MBF supports our contention. This material needs to be harvested before it is lost to natural forces.

Oregon State Director
Bureau of Land Management
Page 2
July 23, 1979

Your document fails to recognize the carrying cost of the excess old growth inventory. This volume is expensive to carry on the books. When one considers the net volume loss that annually occurs in this type of material it is economically desirable to reduce this inventory expeditiously and convert to stands which are achieving high rates of net annual growth.

24-2 I cannot agree with your assumptions concerning community stability relative to utilization of excess inventory. You fail to consider the decreases in volumes of annual harvest on adjacent government units and the increasing tributary areas for mills. Between timber management planning, land use planning and wilderness withdrawals the annual programmed harvests on government lands in Southwestern Oregon have declined 130 MMBF. Private lands, according to the Beuter report will be coming back on line in the late 1980's and 1990's. Anything which can contribute to overcoming the interum shortfall is going to contribute to economic stability, not instability. The economic stability of the area is currently threatened. Your 41 MMBF per year increase for one decade would be a definite stabilizing influence.

In summation, Alternative 3A is an obvious choice. Your document supports it and presents the best argument in it's behalf. I strongly urge you to pursue it.

24-3 I have some comments concerning other elements of the DEIS. I question why you are planting only half of your low intensity harvest lands. I urge consideration of planting on all available acreage, leaving nothing to chance.

24-4 The TPCC accuracy concerns me. I traveled with some of the district staff and observed many of the field procedures. I question the accuracy of the determination and urge a continuing refinement of the process. This should be done and incorporated as data becomes available. It should not be delayed until the next TM planning period.

Your economic forecasts concerning the timber industry are gloomy at best. Through a combination of responsible management on federal lands and plant modernization Southwestern Oregon is not as doomed as you make it sound. It is significant that land managers such as yourself hold one of the keys. Failure to properly utilize it properly would be a shame.

Thank you for the opportunity to comment.

Very truly yours,

John L. Smith

John L. Smith, Chairman
Timber Committee

Response to comments in Letter 24

24-1 Volume losses would be minimized since the plan calls for salvage of dead and dying trees.

24-2 Refer to changes in text in Section 8.3a.12

24-3 See response to comment 14-1.

24-4 See response to comment 16-1.

COMMENTS ON THE DRAFT TIMBER MANAGEMENT ENVIRONMENTAL STATEMENT
JACKSON AND KLAMATH SUSTAINED YIELD UNITS TEN YEAR PLAN
BUREAU OF LAND MANAGEMENT, DEPARTMENT OF THE INTERIOR
OREGON STATE OFFICE

25

Submitted by Southern Oregon Citizens Against Toxic Sprays
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SOCATS has specific questions, comments, and suggestions on the various sections of the DES but we would like to begin with a general statement about the proposed alternative and the other "choices" offered.

Humans and the forest can adapt to short-term reversible impacts, but the public and our public agencies must particularly try to avoid imposing long-term adverse impacts on our ecosystem, especially when they are permanent by design or uncontrollably irreversible. It is essential that decisions and actions on the use and management of our resources come from the perspective of maintaining a forest ecosystem (and human life) that are viable and sustainable. This is not only logical, but is mandated by NEPA and other laws; it is our foremost concern in writing these comments.

The DES contains much valuable information that will help decision-makers and the public understand the situation in the JKSYUs so that wise management actions can be taken. However, important gaps in data base do exist and some of these are mentioned. We appreciate the frankness with which these are presented, but are concerned about the BLM's willingness to embark on massive programs before basic necessary research has been accomplished.

We believe that some opposition to BLM practices or proposals is misrepresented and that certain arrangements of information and euphemisms used tend to disguise the importance of some of the issues and situations; there are also some important omissions. We will specifically discuss these according to their particular context.

INTENSIVE HARVEST AND LIQUIDATION OF OLD GROWTH -- An example of an omission (and consequently a misrepresentation) is found in the first paragraph under 2.18.1 (Social Values) on page 2-70; this reads "Intensive timber harvest ... is seen as potentially harmful by those whose primary interest is esthetics or recreation." Undoubtedly, there are some persons whose primary concern is esthetics or recreation, but there are far more whose concern about the viability of the forest ecosystem and its sustainability have consistently been expressed in oral and written comments on various proposals involving intensive timber harvest and management.
25-1 These should be recognized. The statement quoted is correct, but inadequate without even a mention of these other more serious concerns. This type of omission, along with the BLM's posture of being forced by law to allow maximum timber harvest (while disguising certain other conditions discussed under Employment), reinforce the impression that agency policy is heavily influenced by the lumber industry.

It is usually stated or implied that undisturbed natural areas are demanded and enjoyed only by outdoor primitive recreation enthusiasts. These areas benefit everyone by protecting watershed, airshed, soil, wildlife, plant genetic pools, and various scientific research base. Considering present and predicted degradation of these resources, it is doubtful that we can have "enough" of such areas that will remain undisturbed.

The "virtues and grandeur" of old growth are generally acknowledged and esthetics is involved. However, except for this statement on page 2-19 ("Modifying or removing one particular stage, e.g., old growth, has a profound effect on those individuals and species occurring there. It is recognized that these effects don't stop with just those species, as the ecosystem as a whole is altered by the modification of one of its parts."), the DES channels all concern about the rapid and permanent liquidation of old growth into the "Animal" and "Visual Resource" sections. The subject needs to be considered in those sections and the general statement quoted above is good, but the ecological implications of this type of an action need to be discussed in much greater detail. For instance, the Carroll-Denison research on Lobaria oregana should be examined in relation to fertilization needs. It seems there is a constant subtle effort to classify all appreciation of old growth and efforts to protect some of it into a purely esthetic and impractical framework. (Even within that framework, it is interesting to note on page 3-53 that less than 1% of public land has Class I VRM potential). An in-depth discussion of old growth's vital ecological relationships belongs somewhere in the ES. Also, from a commercial aspect the superiority of wood quality should be considered.

25-2 HARVEST SCHEDULES AND ALLOWABLE CUT -- Under "Alternatives" on page 8-1, we learn that several alternatives are based on harvest schedules not permissable under present law, regulation or policy; these are included "to provide the decision-makers with a variety of choices". If a "choice" is not truly available, how can it be considered? What is the justification for inflating the alternatives unless there is pre-existing knowledge or planning that such choices will become available? Pages 8-31 and 1-22 explain the TPCC determination of the timber base and the calculation of the largest allowable cut sustainable over a 400 year projection, consistent with BLM policy for "a constant or increasing flow of wood over time without any planned reduction". Even with presidential edict to raise the cut (which may be challenged), how could this be allowed in the JKSYUs, which have already been overcut?

25-3 Table 1-4 and Figure 1-3 are quite revealing. Please add another Table or Figure showing the record of acres harvested and regenerated by the BLM.

We appreciate that no harvest is planned on limited forest management lands. The "trial harvest program for low intensity lands" appears to be a method of maintaining an unrealistically high cut by counting this as "research" and not counting it in the allowable cut. While it is purportedly being done "to determine what practices, if any, might be effective to facilitate regeneration within the prescribed 5 year period, and to gather empirical data on the actual regeneration period" (page 1-10), the BLM undoubtedly has many such acres which have already been cut and have not yet regenerated on which to experiment. We are told that "more than
25-4 11,000 acres of high-intensity lands are presently non-stocked or under-stocked"; what are the figures on low intensity lands? Any research should be done on them instead of creating more problem areas.

Page 1-47 explains that at least two assumptions built into the computation of the 1971 allowable cut were not justified and were not included in the new proposal.
25-5 Were they ever subtracted from the former computation? If not, the new computation should be further reconciled. Is the 15% loss of growth from soil compaction on harvested sites figured into the allowable cut? If not, how can credits be taken for factors assumed to accelerate growth?

25-6 COSTS AND ENERGY USE -- Does the expected proposal cost described in the last paragraph on page 7-2 include road construction and monitoring of actions? If not, what are those projected costs?

25-7 Do energy use projections include diesel carrier for herbicide applications? If not, what would that amount to?

ROAD CONSTRUCTION -- Roadbuilding, one of the most expensive and energy-intensive activities in the proposal and alternatives, is acknowledged to have many serious impacts on the forest ecosystem, as well as permanently removing acreage from productive land. Estimates of tons of soil lost are given for the mileage of BLM roads proposed, and it is obvious that these roads must be limited, yet page 2-58 reveals that "Permits and right-of-way agreements with the larger private timber companies ... allows for them to construct across BLM lands or use BLM roads without applying for a permit for every use". 25-8 Is an estimate available on road mileage that could possibly be imposed on BLM lands through these agreements? Are projections of soil loss and other impacts attributable to such action included in the impact section? Is there any way to limit this construction?

25-9 SOILS, EROSION, SEDIMENT YIELD -- The DES discloses that the JKSYUs contain highly erodable and unstable soils. The last paragraph on page 6-1 seems to give an erroneous impression about soil recoverability ("Soils would not recover under natural conditions for 35-40 years.") Since the conditions planned following harvest operations are not natural, some estimate of recovery that has relevance to unnatural conditions should be given.

25-10 On page 7-1, "could" and "would" should be interchanged in the third paragraph to read: "The amount of soil that would be irretrievably lost due to the proposal could be 64,250 tons over the decade."

An update on the Alsea watershed study (R.L. Beschta, "Long-term patterns of sediment production following road construction and logging in the Oregon Coast Range," 1978) shows that although mass soil erosion from roads was the principal erosion process in a 25% patch-cut watershed, surface erosion in the slash-burned clearcut was the primary cause of increased sediment yields. Assumptions about erosion and sediment production will have to be verified by further long-term study.

WILDLIFE -- We appreciate the BLM's planned riparian zone management.

25-11 On page 3-42 we read "...the majority of stream habitats in the JKSYUs are known to be currently in poor to fair condition with the amount of available habitat decreasing". How can the impact of further habitat degradation or elimination be "insignificant to the SYUs as a whole"?

Paragraph 4 on page 6-1 should include mention of habitat and forage for species which utilize brush.

25-12 Shouldn't discussion of increases in animal populations on early successional stages created by harvest operations (middle paragraph on page 3-30) and the top line of page 3-32) include pocket gophers, especially since these animals have become such a problem in some areas that the BLM is proposing a poison bait program for 9000 acres?

Besides the "adverse impact to the gophers" cited repeatedly, there are other possible adverse impacts of this program which should receive more consideration. On one hand, the BLM wants to carry out a massive eradication program (which sounds quite expensive) while concurrently, it seems that many new areas on which gopher habitat will be improved will be created by proposed practices. Perhaps the rodent's role in distributing mycorrhizae-forming spores should be further investigated before initiating this program. Use of strychnine bait seems unacceptably dangerous. The first sentence in 1.3.6.2 (Project Design Features) seems to imply that stability and insolubility in water are desirable qualities for this substance; 25-13 it should be made clear that they mean longer persistence in the environment. Page 1-36 states the bait may remain toxic for 30-90 days. How does it become non-toxic? The safeguards and precautions may look good on paper but (as is the case for the herbicide program) are not dependable. One of the procedures listed on page 1-36 25-14 specifies the protective clothing required for personnel with this project. During this summer's hand-application herbicide program, was the required protective clothing worn at all times?

25-15 SITE PREPARATION -- The DES does not describe site preparation in detail, but the objective of the spray and burn site preparation proposals seem to be to eliminate as much brush and/or grass or other "competition" as possible prior to planting. On page 1-31 we read "Site preparation ... gives tree seedlings a much improved chance for survival and rapid growth in the absence or near absence of competitors. Brush fields and poorly stocked plantations resulting from plantation failures require brush and hardwood control to bring these lands into full timber production." Are not some failures attributable to the very practice of denuding a site? Douglas fir seedlings actually require some shading in their early growth period. JKSYU soils are highly reflective of light when disturbed. (p. 3-52) The removal of vegetation causes increases in soil temperature extremes, decrease in relative humidity, and increased wind velocities (p. 3-2). Since moisture is the limiting factor in S.W. Oregon, these conditions do not seem compatible with plantation establishment. In the Umpqua National Forest, Steamboat Ranger District, shade blocking (in combination with shelterwood cutting and planting) have been used successfully in regenerating harsh droughty southerly exposures. Williamson's and Minore's studies on the Dead Indian Plateau concluded that plantations on severe sites established under a protective canopy have a much higher chance of success than those planted in the open. ("Survival and growth of planted conifers on the Dead Indian Plateau east of Ashland, Oregon", 1978)

We do not find an explanation in the DES for the BLM's enthusiasm for clearcutting and spray and burn site preparation. Please include in the FES a chart or table showing the record of previous clearcuts and regeneration successes or failures in JKSYUs so it is more clear why this method is chosen.

25-16 PALEONTOLOGIC AND ARCHEOLOGIC RESOURCES -- It is admitted that little professional work has been done on researching archeological sites and that paleontologic surveys have been inadequate. If the field survey undertaken prior to the environmental analysis for a proposed ground-disturbing activity did not disclose the presence of paleontologic or archeologic material, but if such material were discovered in the course of the action, is there any provision for stopping the action so the resource can be investigated or salvaged?

BURNING -- It appears that the paragraph headed by "Broadcast Burning" on page 1-30 could also refer to pile burning, so perhaps the title should simply be "Burning". The following comments on the practice of burning may demonstrate why we believe it would be better to cover a topic as completely as possible in one section instead of scattering bits of information through the ES so that the whole picture is difficult (if not impossible) to see.

Page 1-30 tells us that disposal by burning would take place on approximately 2,370 acres of high intensity lands per year. Page 1-31 adds the information that a burning permit must be obtained from the Oregon Department of Forestry prior to undertaking slash disposal and that burning is conducted in accordance with the Oregon Smoke Management Plan, which means that burning is not allowed to begin until smoke dispersion conditions are favorable, as determined by DOF (page 1-45). Delays in accomplishing planned burning may delay planting. (our conclusion) Oregon DOF recently reported that the amount of forest material burned in 1978 was "only half the amount requested to be burned by forest landowners" and "It was a favorable year for burning". Has the BLM made provisions for possible delays in burning?
25-17 It appears that if burning is planned for site preparation, there may be some delays, and these could affect planting.

Burning, while contributing to air pollution and damaging some desirable seeds and the soil (and subsequently increasing erosion and stream sedimentation), also wastes forest materials which could be utilized and sometimes "escapes" and causes forest fires. (Some of this information is dispersed through the DES and some has been found elsewhere) Page 2-11 discloses that human-caused fires accounted for 96% of
25-18 the acres burned from 1966 to 1977. What proportion of these resulted from fire escape from "controlled burns"?

25-19 The burning planned in the proposal and all the alternatives will raise particulates and carbon monoxide levels in violation of the Clean Air Act; how can these violations be deliberately planned? Combustion products of herbicide-treated vegetation
25-20 (not mentioned in the DES) can be more toxic than the original herbicides.

25-21 FERTILIZATION -- The advisability or value of using commercial fertilization in S.W. Oregon has not been established; the massive program proposed is unjustified. Nitrogen is fixed by naturally occurring plants which are targets of the herbicide program (see discussion in the Herbicides section of our comments). Commercial fertilization programs are expensive and energy-intensive and have undesirable impacts such as stream eutrophication; G.W. Bengtson (in "Forest Fertilization in the United States: Progress and Outlook", Journal of Forestry 78:222-229) writes that the availability and costs of nitrogen fertilizers are uncertain. Nitrogen-fixing plants are immediately available (if not removed).

25-22 HERBICIDES -- Somewhere in the description of the herbicide program, the BLM should clearly state that these chemicals are non-selective (in that "control" of target species also results in the killing or suppression of other vegetation, much of which is beneficial, even vital, to nutrient cycling, maintenance of appropriate microclimate, wildlife forage and habitat, and other ecosystem relationships; some of it is threatened or endangered). Some of these points are included in the DES but all these aspects of non-selectivity need to be brought together in one place so this issue is plainly seen.

Table 1-9 should show totals to give a better idea of the scope of this program.

Agency foresters often ask why herbicide opponents direct attention to forest spraying since larger amounts of chemicals are used in agriculture. This is one reason: "Forested watersheds in the United States annually receive more than 114 cm of precipitation (more than twice the amount that falls on other lands). They yield more than 51 cm of runoff annually (more than 7 times the amount for other lands). Thus, the possibility that chemical use in forest management may impact on water quality needs careful consideration." (Storey, 1965 as quoted by Logan Norris in "Toxic Material in Forest Streams", April 1978) The DES states that most of the JKSYUs is forest land and "over 70% of Jackson County's land area is commercial timberland". (p. 2-58) Also, "Howard Prairie, Hyatt Lake, Little Hyatt Lake, Keene Creek and Emigrant Creek Reservoirs are all interconnected..." (p. 2-9) We think the implications are obvious.

In previous comments we have objected to agencies trying to evade their responsibility for chemical use by relying solely on EPA registration. Congressional, GAO, and independent scientific investigations have shown that registration procedures are inadequate. Especially in a case when a chemical is involved in the RPAR process (in which the EPA documents its presumption against registration) and when the public has expressed widespread opposition to use, it is disturbing that a public agency will not be deterred in its determination to impose the toxic substance. Even a cursory review of the EPA's responsibilities, restraints, and impediments and the various evaluations of its performance would preclude placing such blind faith in registration. To try to shift responsibility for use to the EPA when these conditions are so obvious is neither rational nor legal (see Judge Skopil's opinion on Civil 76-438, page 33).

The BLM demonstrated its determination to use Silvex up until the time it was suspended in March even though 2,4,5-T had been put on RPAR nearly a year earlier and it was acknowledged that any action against 2,4,5-T would also affect Silvex. Since the two herbicides are almost chemically indistinguishable, it is baffling that the BLM makes such an issue of their prohibition of the use of 2,4,5-T since 1972. We would appreciate an explanation of this.

25-23 Teratogenicity, carcinogenicity, and mutagenicity have been demonstrated or are suspected for some of the chemicals in the proposal; for others which are included, this kind of testing has not even been done or is not complete (results are not available). 2,4-D, one of the major herbicides scheduled for use, is on pre-RPAR.

25-24 Page 1-32 tells us that combinations of herbicides are used as recommended by knowledgeable scientists. How often are these recommendations offered by and obtained from chemical company representatives? Other agencies have admitted that this happens frequently and may not be the most desirable channel of advice.

One of the most important issues in regard to the use of herbicides is efficacy and this should be addressed in the ES. Although these chemicals have been used in forestry for about 30 years, no field data is offered to support assumptions of accelerated growth of crop trees. On page 1-37 we read "With reduced competition, the conifers rapidly grow beyond the point where they can be overtopped and suppressed by surrounding vegetation." Page 6-2: "Application of herbicides and fertilizers would increase wood fiber production in the long term and provide for higher rates of harvest in the short and long term." To make these claims as state-
25-25 ments of fact, the BLM must substantiate them with field-documented data; otherwise they are assumptions and should be shown as such.

25-26 The statement on page 3-25 that brush will generally not resume dominance after stand release spraying is too vague. How many sprayings would be involved? Only one is implied, but according to other sources, at least 2 or 3 applications would be necessary during the establishment of a plantation. The information about height growth of released trees in the 1967 Gratkowski study (p. 3-26) should be updated. How old were these trees at the time of the study and what were later measurements? More recent information on this should be available. Is this field data from a plantation aerially sprayed or was the release spraying done by hand on a test plot, spraying only the target species to the drip point, a situation quite different from the usual spray application, but one sometimes cited to explain efficacy of chemicals.

25-27 Actual conifer damage has been reported. The second paragraph of page 3-26 quite incidentally (even parenthetically) mentions that destruction of conifer stands may result from herbicide application. (emphasis ours) Why isn't it possible to get figures (or even estimates) on this type of damage or mortality? Agencies are supposed to evaluate their programs. Surely the importance of monitoring and recording this kind of information would be obvious, but the closing sentence of that paragraph is "These types of impacts defy accurate prediction and, therefore, cannot be quantified". (!)

25-28 The public is offered only assumptions or opinions that the "benefits" are happening or will happen in the future; meanwhile, the allowable cut is inflated because of these practices. It is interesting and surely significant that of the 8 species listed in Table 1-9 for 2,4-D application, three of them (tanoak, canyon live oak, and chinkapin) are classed as resistant by Gratkowski in "Herbicides for Shrub and Weed Tree Control in Western Oregon", 1978. Two of the others (madrone and ceanothus) are called "moderately susceptible", which means they may be top-killed but will probably resprout (sometimes more copiously than the original stems). The other 3 species listed were not included in that particular study, but it is commonly known that blackberry resprouts quickly after such "treatment"; we have not yet located information on the remaining two species (hazel and ocean spray).

We note that alder is a proposed target of Roundup and Krenite. The whole issue of "competition", especially of species like alder and ceanothus which fix nitrogen and have other well-known beneficial qualities, is one which has not been resolved. Much research indicates that these species are best left in place. A Forest Service study in Washington (Wind River area) has shown that on a fir stand where alder had been planted as a firebreak, the fir growing near the alder were much larger than the fir in the pure stands; although the trees were sparser near the alder due to "competition", they contained a greater volume of wood because of the increased growth.

Alder is also known to be resistant to laminated root rot and seems to offer Douglas fir protection from that disease, which can wipe out whole plantations. The BLM News Clips for September 1978 reported that Salem District foresters were considering planting resistant trees (such as alder and Western red cedar) in infected stands; another control method being tested is stump removal (which costs about $200. per acre). These are some of the problems (like pocket gopher infestations) that may be intensified by "intensive forest management", but B/C analyses never attribute such costs to those programs. Under intensive forest management, we kill or suppress beneficial species because they compete with crop trees, then apply commercial nitrogen fertilizer because the nitrogen-fixing species have been removed, and then perhaps find other programs to control pests and/or diseases which appear because natural conditions have been upset. Alder also furnishes wildlife browse, is fire retardant, and is a marketable species.

25-29 The discussion of diesel oil carrier on pages 3-33 and 3-34 should mention that diesel prolongs the field life of chemicals by decreasing evaporation and breakdown. The toxicity of diesel to bees should also be considered.

On page 3-8, the second sentence in the first paragraph under 3.3.1.4 (Planting) is "Soil loss from erosion would decrease in direct proportion to the increase in cover since spatter erosion and compaction of the surface by raindrops would be reduced." The planned use of herbicides in site preparation and release purposely reduces the amount of ground cover, thus increasing erosion.

25-30 Under 3.3.2 (Soil Productivity), herbicide use should be included as a practice which causes nutrients to be lost from the forest ecosystem. Since there is a general lack of pertinent research, the conclusion that site productivity would not be reduced significantly by these nutrient losses is too presumptive; existing studies (such as at Wind River) do show nutrient cycling advantages of "competing" vegetation.

Many units in the Medford District were scheduled for spring application of Atrazine this year. In a recent study of Atrazine use on ponderosa pine plantations in south-central Oregon, G.L. Crouch found that spring applications were ineffective.

25-31 On page 3-57 in the discussion of impacts on grazing, we are told that label instructions for atrazine require removal of domestic livestock from the treated area for one year. In this section please include this quotation from the 1967 study by Newton, Norris, and Zavitkovski ("Atrazine residues in deer"): "In general this survey indicates that atrazine applied for grass control on forest lands of southern Oregon will enter several tissues and organs of deer." Much of the land scheduled for atrazine application is grazed by deer (which will not be observing the one year removal from the area). Most hunters will be unaware of this exposure.

25-32 We don't think that the closing sentence in paragraph 2 on page 3-14 is factual; please refer to the Cameron and Anderson 1977 Stream Monitoring Study from the Coos District BLM and use that information in the FES. If the sentence in paragraph 2 is retained, it should be substantiated. Results from sampling mainstems of the Rogue and the Umpqua are not necessarily pertinent to this problem, especially if sampling was not done at critical times relative to herbicide applications; Table 3-6 should include information on those relationships. Water monitoring is an extremely inexact (although expensive) procedure and cannot be depended on for protection. Results are seldom known until long after important exposure periods have passed.

The Cameron and Anderson study, which concluded that with aerial application, the chances of herbicides ultimately entering the stream system is approximately 70%, even with careful application (using 200 ft. buffer strips) should also be considered in relation to the first sentence of the fifth paragraph on page 3-13. The sentence on pages 3-13 and 3-14 ("Some herbicide traces (a few parts per billion) could appear for a short period in nearly all streams which flow immediately adjacent or through treatment areas only if there were no buffer zone.") is also contradicted by the Cameron and Anderson findings. The statement on page 5-4 ("It is doubtful, although possible, that levels of toxic chemicals so introduced could exceed lethal levels for aquatic organisms") may need to be revised; Cameron and Anderson write: "The toxic dose is one that produces adverse effects (in non-target organisms) and is not necessarily limited to a lethal one. ...in the case of stream contamination, perhaps the amounts of residue aren't enough to be considered lethal or even slightly toxic to the various species of fish inhabiting the

stream; however these amounts may be enough to adversely affect other aquatic organisms such as the insects and crustaceans and therefore the indirect effects on the fishery may be quite substantial. This seems to be where some of the problems lie, i.e. it's difficult at times to view the situation as a whole, rather than considering the various components. ...it is virtually impossible to determine the impact of a particular pesticide when no plans have been considered to determine what the biotic community consisted of prior to the aerial application of the pesticides. ..."

25-33 We disagree with the second sentence in the first paragraph of 3.2 (Impacts on Air Quality). Air pollution from volatilized herbicides could indeed have significant impact on the quality of the airshed when compared to additions from other sources. Any person who has been sensitized to these chemicals from previous exposure can attest to that. Also, Hopkins and Howard (Chemical Tools and Forest Management, 1971) found that with aerial application of herbicides, the loss to the atmosphere ranges from 20 to 80%. Inhalation exposure is quite possible. The RPAR document in the 12 April 1978 Federal Register states that no inhalation studies are available; without this kind of research, claims of no significant impact cannot be made.

25-34 Section 3.16 (Impacts on Human Health) is entirely inadequate as it does not even mention the primary health hazard concerns about herbicide use, which are chronic toxicity, sensitization, teratogenicity, fetotoxicity, carcinogenicity, and mutagenicity. The research described on pages 3-71 and 3-72 about "relative non-toxicity to humans" covers only acute toxicity and lethal doses, which are not a major concern with forest use. The longer-term effects must be addressed in this section. The fact that no studies on these effects are available for some of the chemicals scheduled for use and that others are proven or suspected teratogens, carcinogens, or mutagens should be included.

The assumptions that herbicide applications are stringently controlled and that safeguards are constantly observed are not supported by records of spray operations. There is little or no margin for error in the application of these chemicals, yet errors (and carelessness) do occur. The Cameron and Anderson study quoted on this page and the previous page contains examples of such errors. Anderson states, "The herbicide program was large and fast moving with typical problems of coordination, logistics, weather, equipment failure, etc." It should be kept in mind, however, that concentrated efforts were made on this project to avoid errors.
The DES offers us "project design features" to "reduce risk of exposure". (p. 3-71)
Under 3.4.2 (Water Quality), the section concludes with "Impacts of herbicide treatment upon water quality would not be significant if all design features were successful." (p. 3-11) Rarely, if ever, are all design features successful; that "if" is lightly used but extremely crucial. Project design features do not protect the public or the environment.

25-35 Nowhere, through all these scattered pieces of information on the herbicide program, do we find any mention of the BLM Director's March 16 order for "full use of non-chemical methods to control undesirable vegetation". The only control program offered in this plan is a chemical program. Cost cannot be the major criterion, especially when alternatives can avoid the major adverse impacts of herbicide use and can accomplish the needed action with a specificity which is not possible with herbicides. Cost comparisons must consider these differences and also assess the real costs of these programs more realistically.

EMPLOYMENT AND ECONOMIC FACTORS -- The BLM has an active PR program to promote public understanding and acceptance of its proposed programs, such as vegetation management with herbicides. There is much information in the DES to support a lower timber harvest and to show that a lower cut would not increase unemployment, although there would be a change in the kinds of jobs available when the emphasis is on reforestation rather than cutting. Yet we find the agency resistant to rational changes in the allowable cut and even apologetic about those they are forced to make because whenever lower harvest levels are proposed, the lumber industry stirs up concerns about jobs. Why doesn't the BLM disseminate some of the information about the allowable cut and employment which is found in the DES?

Paragraph 1 under 3.14.1.1, which states that local employment would be relatively unchanged although less timber would be harvested under the proposal than with continued current management, actually shows a net increase in jobs (due to expanded forest management employment).

Page 2-59: "In recent years, timber based employment has been declining as a percentage of total county employment." Page 2-64: "...the County's (Jackson) economic dependence on timber is expected to decline over time even if the resource supply remains constant as other segments of the economy grow." (Beaton 1978)

The BLM has come up with a remarkable number of ways to say "automation" or "mechanization" (all quite vague and confusing). These may politely be called euphemisms and they appear to carry at least some degree of purposeful intent to be vague or confusing. Evidentally, alternate terms for "log exports" are still being searched for so that subject has been omitted. Doesn't the Wall Report show that employment levels are related to mechanization (first), log exports (second) and level of harvest (third)?

Alternative phrases for automation or mechanization:
Page 2-60: "technological changes in the industry"
Page 2-64: "Due to technological changes, jobs per unit of timber harvested and processed will decline, even with sustained yield policies."
Page 3-64: "expected increased labor productivity"
Page 3-68: "projected 1990 labor productivity"
Page 3-68: "an expected decline in labor intensive practices"

Probably credibility with the public would greatly improve if the BLM spoke a little more plainly here.

But the point is that none of these projections take into account some factors which could be the most important in increasing and stabilizing forest products employment: manual brushing, coppice harvesting, utilization of hardwoods and timber residues (forest mulching, chipping for fuel, particleboard, and/or gasahol, hogged fuel, firewood, furniture or pallet wood, woodcrafts, hardwood lumber are some possibilities). Research is already far advanced in the subjects of availability and utilization of these materials; our government agencies should be taking the lead in implementation. We simply cannot continue present wasteful and polluting practices and these employment opportunities are needed. Unless attempts to block these opportunities are successul, these practices hold a key to solving some wood materials, energy, and employment problems.

ALTERNATIVES -- More realistic names should be given to some of the alternatives, especially to #5 which is labelled "No Action"; that designation gives a completely erroneous impression about the alternative. Why can't it be called what it is: "Continuation of Present Management"?

"Utilization of Surplus Inventory" is also a distorted title; Alternative #3 is actually "Rapid Liquidation of Old Growth".

25-36 Surely Alternatives 3,4, and 5 would have significant impacts on soil productivity; the last paragraph on page 8-1 claims otherwise. Losses of site productivity following soil compaction are admitted; that these alternatives will cause soil compaction is admitted.

25-37 Under 3.4.2.2 (Chemical Quality) on page 3-12, the first three paragraphs concerning the introduction of nitrogen into water should be followed by the last two paragraphs of that section (p. 3-14), instead of having these two portions about nitrogen divided by discussion of other elements and herbicides.

25-38 Paragraph 3 on page 6-1 about the long-term production of wood fibers should acknowledge that wood quality produced under the proposal and the alternatives which accelerate growth and harvest rotations will be much lower than that obtained from old growth timber. This point (not mentioned in the DES) is extremely important and should also be included in other sections.

In the "Animals" sections of the alternatives, paragraph 4 should directly follow paragraph 2, and then paragraph 3 should follow that, so that considerations of the effects of harvesting are not separated by herbicide impacts. Dividing these effects confuses the issues.

Under Visual Resources (8.36.8) on page 8-24, a more realistic and accurate closing sentence for the section would be "The virtues and grandeur of old growth would be permanently lost as a visual resource on the harvested units."

The explanation of "Limited Investment in Timber Production" (Alternative 2) would be more clear if it also specified which practices are not included in that management plan (8.2 on page 8-10)

25-39 Description of vegetation (8.1.4) under Alternative #1 should mention that this alternative would retain vegetation beneficial to nutrient cycling, wildlife forage and habitat, and other ecosystem relationships.

25-40 Why is soil erosion under Alternatives 3a, 3b, 4, and 5 figured at 63 to 64% <u>less</u> than erosion under present management and sediment yield estimated to be 31 to 53% <u>below</u> the present situation? Meanwhile, soil erosion for Alternatives 1 and 2 (which project much lower harvest levels) is estimated at a comparable 64% less than present management and sediment yield is figured at 50 to 54% less than at present. Two issues are involved here: comparison of impacts of Alteratives 1 and 2 with impacts of the other alternatives and comparison of impacts of all the alternatives with present management. Since Alternative #5 is a continuation of present management, why are the greatest changes in soil erosion and sediment yield reduction estimated to occur with it? Harvest level is higher than the other alternatives and road construction mileage is scheduled to be the same for all the alternatives. Major causes of erosion and sedimentation are thought to be road construction and yarding, so the differences are puzzling. In the case of present management, perhaps there was a much greater amount of roadbuilding this decade than that proposed for the next 10 years or maybe some other factors are involved that we are not considering. Further explanation in the FES would be helpful.

In some sections, the quantifiable impacts of the alternative being discussed are compared with both the proposed program and to present management, but in some cases (such as 8.3a.1 and 8.3a.2), comparison to the proposed program is omitted. This information would be helpful in each section.

We do not think that the future environment without the proposed action should be presumed to be an extension of present management. While it is enlightening and perhaps necessary to compare the various possible actions with present management, the state of the future environment should be freed from that association. Presumably, the formulation of this 10 year plan provides the opportunity for a fresh start in management methods.

FORMAT -- CEQ regulations require that all the topics now used as chapter divisions be covered in an ES, but we don't think this exact format is mandatory. Although cross-references seem to have been used to better advantage than in some previous ESs, there is still a great amount of repetition that could be eliminated if a different arrangement of material were used; this would also clarify the presentation and the impacts would be better understood.

Our suggestion is to begin with the Description of the Environment essentially as it is now written. The second section would be called something like "Authority, General Policy, and Plan Development"and would include the material in 1.1 through 1.2.7 and 1.4 through 1.5.3. Third would be "Proposal and Alternatives". This would begin with the brief descriptions in 1., 8.1, 8.2, 8.3, 8.4, and 8.5 and be followed by the discussion of design features and allowable cut comparisons now in 1.3 and 1.6. The proposal and each alternative would be related to each design feature as is now done with the proposal in Chapter 1. Since some features, like the transportation system (1.3.1) are essentially the same for each possible action, only one description would be necessary with the statement that all the plans would be the same. For cases in which there are differences between the alternatives, these can best be seen and compared when they are shown together under the topic. If there are only slight differences, the proposal would be described, then for any alternative that differed slightly: "same as proposal except ..." Many pages (and much confusion) would be saved. The fourth section would be "Impacts" and would incorporate Chapters 3,4,5,6,7,8& part of 1. Beginning with the impacts in Chapter 3, the proposal and each alternative would be discussed in relation to each impact in the same manner as the previous section. (Please be sure that "Long-term productivity", now covered in Chapter 6, addresses sustainability).

Coordination and Consultation would then become the fifth section and in the FES would include consideration of public input on the DES. We suggest that letters be reduced in size so they can be printed two to a page. If petitions are submitted, it should not be necessary to completely copy them. The wording of the petition could be shown once with a list of the signators, or just the total number shown; if copies are made of all the pages, at least they could be combined to eliminate blank spaces so that whole pages would not be printed with only one or a few signatures as was done in the Vegetation Management with Herbicides FES. If letters are printed, please use some type of numbering reference system beside each comment that is answered or addressed in the text so it can be known whether the point is discussed and where.

Isn't an index now a requirement? If so, it will be much more difficult to make one under the present arrangement than under the one we suggest. For instance, some of the references on burning which we found were on pages 1-30, 1-31, 1-45,

3-2, 3-3, 3-4, 3-7, 3-8, 3-12, 3-13, 3-24, 3-49, 5-1, 6-1, 7-1, 8-4, 8-11, 8-16, 8-21, 8-27, 8-32 (there are probably many more). If the format were changed, these would be concentrated on a few pages and would therefore be much easier to find even without an index. In the present situation, the reader must go through the entire document to locate everything on a particular subject. In the interest of clarity and the paper shortage, we hope you will consider these suggestions.

RECOMMENDATIONS FOR AN ENTIRELY DIFFERENT ALTERNATIVE

Because of the many irreversible impacts on irreplaceable resources and the energy-intensiveness of the proposal and most of the alternatives, plus the dubiousness that any of them can accomplish the desired objectives, we suggest that the BLM look at some possibilities which are not even considered in the DES. Instead of accepting these tremendous adverse impacts as unavoidable, effort must be directed into developing more beneficial and positive alternatives. Some are available and it is essential to examine and consider them.

25-41 First, all unfeasible alternatives should be eliminated from the ES. There is no justification for giving space and time to plans that are unlawful, unwise, or against BLM policy.

Emphasis on reforestation is essential, but instead of counting the trees before they are planted (and growing), we must know that past goals are being met. The assumption cannot be made that we can go from a backlogged situation to super-production in a few years; we cannot bequeath further deficits on future generations. The roots of the 10 year plan must be firmly planted and not be hung up in the sky with pie.

Experiments with species manipulation have turned into massive programs and are becoming entrenched as the principal management of some of our forest resources. We appreciate the BLM's stated intention to replant harvested units with naturally-occurring species. We believe that wholesale programs to eliminate or "suppress" competing species should not be instituted; herbicide use falls into this category because of its nonselectivity. Unresolved questions on efficacy and long-term effects to the forest ecosystem and to humans take this practice out of the category of acceptability.

The acknowledged massive impacts of road construction are sufficient to warrant serious reconsideration of plans. There are recent findings that cutbank erosion predicted is further enhanced by heaving frosts, making the sediment problem more complicated. Soil lost is virtually irreplaceable and committment of timber acreage to roads is a permanent loss. Perhaps helicopter logging, or even horse logging could be used on some sites (like those with the most erodable soils) to eliminate some of the projected mileage. It is essential to show roadbuilding costs in the FES.

The Wolf Creek Trails Proposal should be considered under recreation programs. Page 2-30 states that "much hiking occurs despite the limited amount of maintained trails". This proposal, developed by Wolf Creek residents, is designed to be a link with the Pacific Crest Trail. It should be considered in the FES.

The BLM's intention to do some single tree harvesting in certain areas is encouraging. However, we believe that "trial harvest" on low intensity lands is unwarranted; there must be plenty of unstocked lands in that site classification on which regeneration experiments can be done. On the high intensity lands, harvest practices can possibly be revised to lessen impact on streams, especially those cited as already having a severe sediment problem and/or severe stream bank erosion. Clearcutting plans should be seriously questioned. A new study, "Changes in streamflow following timber harvest in Southwestern Oregon" by Harr, Fredricksen, and Rothacher found that annual water yield increased an average of 43% in a clearcut watershed compared to 8 to 14% in partial cut and patch-cut watersheds. Increase in size of instantaneous peak flow was apparently related to soil compaction. In consideration of these and other findings, it is indicated that clearcutting should be minimized and the percentage of cable yarding further increased.

The July 1979 FIR REPORT (Vol. 1, No. 2) describes successful reforestation methods for dry sites used in the Yreka area by Fruit Growers Supply Company on their Hilt Forest. Debris and competing vegetation are incorporated into contour berms during site preparation by scalping the first few inches of surface soil. Other practices which may not be practical on JKSYS sites are also used, but it seems that this site preparation technique might be applicable.

Until there is documentation of efficacy in this region, fertilization should be limited to small trial areas. As mentioned earlier, if nitrogen-fixing vegetation and other nutrient-cycling plants and organisms were not removed or suppressed by other "intensive management", artificial fertilization might be entirely unnecessary. There is also the possibility of planting nitrogen-fixing vegetation on nitrogen-deficient sites.

25-42 Why is manual brushing locked out of all the proposals? The Vegetation Management with Herbicides FES states that Department of Interior guidelines require a broad spectrum of vegetation control methods; burning and herbicides do not seem like a very broad spectrum. The Director of the BLM ordered full use of non-chemical methods. Even if the BLM does not agree with our arguments against burning, state restrictions prevent full use being made of that method of control. We suggest that grazing, mulching, or manual methods be used for whatever selective vegetation control is necessary; manual brushing can be combined with coppice harvesting. The maximum amount of residues allowable under fire regulations should be left on the forest floor for decomposition or incorporated into the soil in the site preparation method mentioned in the second paragraph above. If the materials which must be removed are not "commercial", new types of contracting or custodial management strategies could be initiated to accomplish removal and utilization. We presume that the BLM's recent proposal for utilization of timber residues will be included in the FES. Burning, which wastes these materials and creates air pollution and other problems would not be necessary.

CONCLUSION -- The O & C Act seems to be constantly referred to as forcing the BLM to put highest priority on timber production and harvest, yet on page 1-1 of the DES this act is described as requiring management of these lands "under sustained yield principles in order to provide a permanent source of timber supply, protect watersheds, regulate stream flow and to provide recreational facilities." The objectives and probable effects of the proposed 10 year management plan (and some of the alternatives) appears to be entirely different from those cited in the act. The plans in the DES seek to establish as high a cut as possible now at the

expense of future supply, watershed protection, streamflow, recreational facilities, and other vital resources such as soil, air, and wildlife and the very sustainability of the forest ecosystem.

On page 1-11 we read: "Alternatives that best resolve conflicts while maintaining the maximum possible quality and quantity of all resource values involved are selected." If this is true, some major changes will have to be made in the alternatives considered.

Diversification is logical and essential considering the problems which have been created by past practices, the necessity for energy conservation and for better utilization of available materials, and the decline in high-quality old growth. Chipping for fuel, particle-board, or gasahol and other utilization technologies are immediately feasible. A lower softwood harvest, increased hardwood utilization, and salvage of presently wasted residues (after an optimum amount is returned to the harvested site) could expand wood products industries and related employment. Combined with ecologically sound management, adverse impacts could be minimized or avoided and the mandate of the O & C Act met.

We appreciate this opportunity to offer our comments and hope the BLM will make some rather drastic changes in the JKSYU ES.

26 July 1979

Submitted by

for Southern Oregon Citizens Against Toxic Sprays

Response to comments in Letter 25

25-1 Refer to change in text in Section 2.18.1

25-2 See response to comment 12-17.

25-3 Table 2-15 summsrizes data on timber ssles and shows, in sddition to other intensive management practices, acres harvested and plsnted during fiscal years 1972 through 1978.

25-4 The manner in which timber is harvested plays an important role in regeneration. Some lands which are now classified as low intensity lsnds were harvested in the past with methods no longer considered feasible for these areas, resulting in a backlog of unstocked or understocked acres. The trial harvest of low intensity lands would incorporate only those harvest and reforestation methods which are expected to result in successful regeneration within a reasonable period of time.

25-5 The main reason for a 10-year reinventory and s timber management plan on a 10-year cycle is to update assumptions used in determining the annual allowable cut. The continuous inventory program is designed to identify and make necessary corrections to previous assumptions.

The 15 percent loss of growth referred to in Section 3.3.2.1 is based on Table 3-3 which is a worst case analysis of soil disturbance and compaction attributable to yarding. Assumptions used in allowable cut calculations are based on normal occurrences rather than worst case analysis.

25-6 The projected operating cost for implementation of the proposal includes funding for road construction and monitoring.

25-7 Costs and energy requirements for herbicide application take the diesel carrier (when used) into consideration.

25-8 The statement concerning no permit being required wss incorrect snd has been deleted from Section 2.16.6.2.

A party to a right-of-way agreement must file a map showing the location of intended road construction on the lands of the other party(ies). BLM or the private party(ies) may reject a proposed road location if (1) it is not the most reasonable, direct route; (2) the route involves frsgile lands where excessive erosion is probable; or (3) the route would interfere with existing improvements. No estimate of road mileage is available, however the mileage constructed in the next decade is expected to be low since most private lands have recently been cut over.

25-9 The text in Chapter 6 has been revised.

25-10 The text of Chapter 7 was changed as suggested.

25-11 The Section 3.6.3 Fiah was rewritten in response to other comments. It was concluded that the impacts would be adversely significant to the individual small streams and adverse but minor to the larger systems.

25-12 The species mentioned on pagea 3-30 and 3-32 of the DES were only used as examples. The pocket gopher could have been included along with several other species.

25-13 The bait remains toxic for varying lengtha of time depending on soil conditions and moisture. The strychnine doesn't break down, but as the bait (oats) decomposes, the strychnine presumably becomes unavailable to pocket gophers.

25-14 The required protective clothing was worn at all times.

25-15 The recently completed TPCC identifies approximately 16 percent of the high intensity lands as possessing soil, topographic and climatic conditions suitable for clearcut harvest (Section 2.1.1) techniques. Two-stage shelterwood, single tree selection or commercial thinning harvest methods would be carried out on all other lands scheduled for harvest. See also the response to comment 25-4.

25-16 Contract stipulations state that should any cultural resource be encountered on the contract area, all operations in the vicinity of the cultural value shall be immediately suspended and the authorized BLM officer shall be notified. Operations may resume at the discovery site only upon receipt of written instruction from the authorized officer. This information has been added to Section 1.3.

25-17 There probably would be some burning delays and resultant delays in planting. However, these delays are not expected to be of such duration as to upset the assumptions of the plan.

25-18 During the 12-year period from 1966 to 1977, none of the human-caused fires in the JKSYUs were from controlled burns.

25-19 Burns are planned under the statewide Smoke Management Plan which is coordinated with the Oregon State Department of Forestry and the Oregon Department of Environmental Quality. While there is the possibility of air quality violations, every effort is made to keep smoke from slash disposal operations out of population centers. For results of slash burns for Jackson County in 1978, see responses to comments 18-1 and 18-2.

25-20 The Medford District does not plan to burn herbicide-treated vegetation.

25-21 See response to comment 1-5.

25-22 See response to comment 12-5

25-23 Changes regarding 2,4-D have been made in Section 3.16 Impacts on Human Health. To date, 2,4-D is not on pre-RPAR status (Personal Communication, Bob Poss, EPA, Seattle, Washington, August 22, 1979; reconfirmed, September 26, 1979).

25-24 Where combinations of herbicides are used, their use is based on recommendations of experts in the field and not from chemical company representatives.

25-25 See Section 3.5.1.4 Chemical Vegetation Control (Herbicides) and responses to comments 1-5 and 12-4.

25-26 Under normal conditions only one release spray is required for correctly applied herbicides that are considered effective for the type of vegetation to be controlled. A more recent study (Gratkowski and Lauterback 1974) regarding height growth of released trees and method of herbicide application has been referenced. (see Section 3.5.1.4 Chemical Vegetation Control - Herbicides). This study showed that the height growth of young Douglas-fir for a 5-year period after release increased in different amounts relative to the height of the trees when released and the method of release. Heights of the trees when released were between 1 and 6 feet. Percent increase in height growth over non-released trees varied from 130 percent (for trees 1 foot high when spraying occurred) to 149 percent (for trees 6 feet high) for basal spray plots and from 155 percent (for trees 1 foot high) to 71 percent (for trees 6 feet nigh) for aerial spray locations. (Gratkowski and Lauterback 1974, Table 1)

25-27 Section 3.5.1.4 has been revised to note that minor burning of needles by oil carriers occurs and that improper herbicide application may result in damage to conifer stands. Water, not oil, is the predominant carrier now used in herbicide spray formulations. (See Appendix B, Table B-1). For greater detail on herbicides and the provisions for monitoring of herbicide application, see the FES Vegetation Management with Herbicides: Western Oregon - 1978 through 1987 (USDI, BLM 1978d).

25-28 Benefits from vegetation control as reflected in forecasts of timber production levels arise from effective vegetation control measures, be they herbicides or manual methods. The species listed in Letter 25 as resistant are impacted by 2,4-D (Oregon Weed Control Handbook, January 1979). In general, BLM's objective is not to kill the target species but to set back its growth for a sufficient time for the conifers to obtain dominance. The herbicide 2,4-D is sometimes used in combination with other herbicides in order to treat several target species, such as grass and brush, at one time. (See footnote, Table 1-9).

25-29 While there are no known scientific studies establishing diesel as an inhibitor of chemical breakdown and evaporation, authorities indicate that this is possibly the case. Although diesel is no longer used as the primary carrier for herbicides, minor amounts are sdded to some mixtures to aid in dilution and penetration.

Toxicity to bees has been discussed in BLM's FES Vegetation Management with Herbicides (1978).

25-30 The text of Section 3.3.2 has been changed to reflect the potential for loss of soil nutrients following herbicide treatment.

25-31 The study referred to continues to say that while atrazine will enter the tissues and organs of deer, the length of persistence is not clear and that "The likelyhood [sic] of encountering dangerous residues of atrazine in tissues of importance for human consumption appears low."

BLM's FES, Vegetation Management with Herbicides (1978) discussed atrazine accumulation in deer tissue and the information is taken into consideration when the spraying plans are developed.

25-32 Results of the Cameron and Anderson study in Coos Bay showed that 9 of the 11 streams intensively monitered did not exceed the 0.02 mg/l limit on 2,4-D set by U.S. EPA. This information is included in the final FES, Section 3.4.2.2.

25-33 This conclusion has been deleted from Section 3.2.

25-34 See text changes in Section 3.16.

25-35 See response to comment 12-15.

25-36 Discussions of soil productivity impacts have been included in Chapter 8 of the FES. The acreage impacted by soil compaction has been inserted into Chapter 8 text and also into Table 8-4.

25-37 The suggested editorial changes have been made in Section 3.4.2.2.

25-38 High quality of timber is no longer a management criterion. Industry utilization standards are shifting in recognition of this circumstance.

25-39 The impacts to those environmental components affected by each of the alternatives are summarized in Table 8-4.

25-40 Two major factors account for differences in soil erosion between the alternatives and the present situation. Primarily, reduced road construction in the future will lower erosion losses. In addition, a reduction in shelterwood harvest would lower losses when compared to present levels.

25-41 See responses to comment 12-17.

25-42 See response to comment 12-15.

P.O.S.E. Committee
5288 Little Applegate Road
Jacksonville, Ore. 97530

July 27, 1979

Oregon State Director
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

Dear Sir:

We would like to comment on two issues which were not fully considered in the draft Environmental Statement.

26-1 Our criticism is concerning the land management class and the methods presently used to determine this. It appears that the forest land is put into a High, Low or Limited Management class primarily on visual observations. Whilst this method may prove to be accurate for the greater percentage of the forest land, there are cases where the land is marginal and classification may be difficult to determine. In such questionable cases, future management practices should not rest solely on the eyeball judgement of one or two individuals. In these marginal areas the Bureau should use the technology available to it to determine the management class and should present the public with scientific reasons for the classification. On these units where it is questionable whether the benefits of intensive harvesting outweigh other considerations a Stand Density Index should be conducted in order to establish an accurate productive capacity.

26-2 The B.L.M. must also consider in it's final Environmental Statement, it's relationship to, and responsibility toward local recreational needs. There is an increasing need to provide and allow for more scenic and recreational areas that are 'closer to home' because the cost and scarcity of gasoline is putting many of the more distant traditional beauty spots out of reach for many people.

We hope our comments will be considered.

Yours truly
for P.O.S.E.

C. Diane Albrechtsen

C. Diane Albrechtsen

Response to comments in Letter 26

26-1 See response to comment 16-1 (second paragraph).

26-2 The analysis of impacts on recreation in the ES assesses the cause and effect relationships between the proposed action and the alternatives and the existing recreational values and projected recreational demand. Table 1-10 illustrates the relationship of the proposed action to the statewide (LCDC) goal of satisfying recreational needs. BLM's role in meeting specific local outdoors recreation needs is more explicitly addressed in the recreation recommendations of the Medford District's proposed Management Framework Plan for the area.

DON LAWS
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BEAR CREEK VALLEY SANITARY AUTHORITY, CITY & RURAL FIRE DISTRICTS, IRRIGATION DISTRICTS, ROGUE VALLEY TRANSPORTATION DISTRICT, SCHOOL DISTRICT 549C, SOIL & WATER CONSERVATION DISTRICTS, WATER DISTRICTS

ROGUE VALLEY COUNCIL OF GOVERNMENTS

August 6, 1979

State Director
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Director:

RE: A-95 Review Comments-- BUREAU OF LAND MANAGEMENT

Project: TIMBER MANAGEMENT ENVIRONMENTAL STATEMENT FOR JACKSON KLAMATH

State ID#:

The Rogue Valley Council of Governments Board of Directors voted to accept the comments submitted on the above-captioned project. The Board further directed that these comments be forwarded to the applicant, grantor agency and the State A-95 Clearinghouse.

In addition, as required in OMB A-95, comments from other local agencies are included, if applicable.

Thank you for complying with the regional A-95 requirements.

Sincerely,

Dennis G. Lewis/sp

Dennis G. Lewis, AICP
Executive Director

LEWIS/sp

Enclosures

cc: Kay Wilcox, A-95 Coordinator
State Clearinghouse

Rogue Valley Council of Governments

A-95 Review

RVCOG NO. 7906-07 **4**

APPLICANT: BUREAU OF LAND MANAGEMENT P.O. Box 2965 Portland, Oregon 97208	GRANTOR AGENCY: Oepartment of Interior
TITLE: TIMBER MANAGEMENT ENVIRONMENTAL STATEMENT FOR JACKSON-KLAMATH	REQUEST: request for comments LOCATION: Jackson, Josephine and Klamath Counties

SUMMARY: The Bureau of Land Management proposes a ten-year timber management plan for for the 488,25B acres of public land in the Jackson & Klamath Sustained Yield Units of the Medford District. Proposed annual timber harvest is 20.55 million cubic feet (120 MM bd.ft.) consisting of 115 MM bd.ft. as sustained yield allowable cut from high intensity forest management land and 5 MM bd.ft. as trial harvest from low intensity forest management land not included in the sustained yield computation base. Treatments specified by the proposal include road construction; harvest by two-stage shelterwood, clearcut, and single tree selection methods; slash disposal; site preparation; planing of trees; herbicide application precommercial thinning; fertilization; and commercial thinning. This proposed action would reduce annual timber harvest from the Jackson & Klamath SYUs by 1.38 million cubic feet (8 MM bd.ft.). Air quality would be adversely affected by particulates from slash burning. Adverse impacts to soil and water resources would be of a lesser magnitude than under the present program, but significant adverse site-specific impacts would still occur within the proposed action.

CONTACT PERSON:	STATE ID NO:
DATE RECEIVED: June 24, 1979	ESTIMATED APPLICATION FILING DATE:

AGENCIES TO COMMENT	COMMENTS
Jackson Co. Board of Commissioners	
Josephine Co. Board of Commissioners	
Jackson Co. Department of Planning and Oevelopment- Air Quality Div.	It has adverse effects. Additional comments attached.
RECOMMENDED COUNCIL ACTIONS:	Forward comments.

Jackson County Planning
Air Quality Division

DRAFT: July 16, 1979

I have reviewed the draft Timber Management Environmental Statement prepared by the Bureau of Land Management and the Department of the Interior.

This office deals with air quality and is responsible for the development of air quality maintenance plans for transportation related air pollution, and works closely with the State Department of Environmental Quality in developing complete air quality plans. Comments provided, by this office, will be limited to those dealing directly with air quality.

27-1 Section 2.2, page 2-4, describes current air quality conditions within the Medford-Ashland air quality maintenance area. Unfortunately, the information cited is no longer considered an accurate description of this air shed.

Levels of particulates in ambient air are reported, most commenly, as a geometric mean of the annual sampling data. Unusual daily levels are discounted, thus attainment of the ambient air quality standards are based on the annual goemetric mean of regularily taken samples, normally on an every sixth day frequency. As reported in the Oregon Air Quality Annual Report of 1977, and testimony of the director of the Department of Environmental Quality, submitted at a hearing of the Joint Legislative Committee on Trade and Economic Development, the Medford-Ashland air shed is experiencing a worsening of air quality, not an improvement.

Until such time as attainment with ambient air quality standards is shown, at the least, new sources of particulate emissions are subjected to a stringent off-set rule, which requires a greater than one-for-one reduction in total emissions prior to the start-up of a new source. This rule applies only to

new industrial sources, though debate now surrounds grass seen burning in the Willamette Valley.

The table below summarizes recent particulate air quality, noting a health standard of 75 micrograms per cubic meter (75m/grms/m^3) and a state of Oregon standard, equal to the federal secondary standard of 60 m/grms/m^3.

YEAR				Annual Geometric Mean
1975	1976	1977	1978	
71.7	82.5	87.2	99.0	m/grm/m^3

Clearly the air shed is experiencing a worsening in air quality. The Medford-Ashland air quality maintenance area is now being designated as a primary standard nonattainment area, with additional control strategies needed prior to March of 1980.

27-2 Section 3.2, Impacts on Air Quality, describes impacts on the air shed based somewhat on the previously mentioned misconception of an improving particulate air quality situation.

The Timber Management plan represents a new source of particulate emissions, some of which will impact the air shed. The impace associated with slash burning may result in a number of effects unaccounted for in Section 3.2. They are listed below:

1) Need to find an off-set of emissions.

2) Increased emissions from slash disposal will be accounted for in an overall total emission reduction plan, which could result in additional industrial emission controls being necessary.

3) Due to severity of existing problems and the increased emissions this Timber Management plan represents, the local timber industry may not be able to accommodate the increased forest harvest, due in part to off-set requirements.

27-3 I recommend that the plan include provisions for some alternative means of slash disposal, such that emissions may be reduced substantially. Furthermore, the air quality information portions should be corrected to represent current information.

Response to comments in Letter 27

27-1 The downward trend in particulate levels was for the number of violations occurring annually. The text of Section 2.2 of the FES was changed to reflect this, and to include the data on worsening ambient air quality with respect to particulate levels.

27-2 The text in Section 2.2 has been changed to include the information provided, and these changes are reflected in Section 3.2.

27-3 See response to comment 10-2.

Appendices

App.

Appendix A

Three-Year Timber Sale Plan FY 1980-1982 for the Jackson and Klamath Sustained Yield Units

This appendix illustrates the timber sale plans which would be implemented under the proposed action. Figure A-1 (large fold-out map in pocket on back cover) plots the central location for the sales listed in this appendix.

Table A-1

Timber Sale Plan FY 1980
Jackaon & Klamath SYUa

Location Number	Vol. Million Bd. Ft.	Miles of Road Construction					Harveat System (Acres)	Logging Methods				Reaidence Within One Mile	Est. Acrea Burned	Soil Associations Type (Acrea)
		New		Improved				Clearcut Ac.		Partial Cut Ac.				
		Surf.	Unsurf.	Surf.	Unaurf.	Temp.		Cable	Cat	Cable	Cat			
80-1	4.5		0.2				SOR(415)			45	370	0	0	840(137)809-810(142) 850(136)
80-2	5.8	1.6					SR(321) T(51) L(70)			170	272	0	321	840-842(415) 850(27)
80-3	4.0	0.3					SR(125) CC(110) T(24)	110		49	100	0	0	840(170) 850(89)
80-4	2.0		1.7				SF(203)				203	0	50	882(203)
80-5	6.6	2.0		5.0			SOR&T(260) SF(840)				1,100	0	500	882-880(1100)
80-6	8.0						SOR(260) SR(209)				469	0	200	810-809(234) 809-810(235)
80-7	0.6						T(31)				31	0	0	809-810(31)
80-8	1.2		0.6				T(60)				60	0	0	809-810(60)
80-9	1.7		0.9				SR(296)				296	0	10	810-809(296)
80-10	6.6		1.4				SR(442) IR(85)				527	3	200	809-806(427) 809-810(100)
80-11	3.8						SR(167) SF(160)				327	0	160	809-810(327)
80-12	7.0	0.8					SOR(191) SR(177) CC(40)		40	100	268	0	40	371-372-370 XY(300) 824-825 XY(108)
80-13	8.0	3.0					CC(120)	100	20			0	100	810-809WXn (120) 740-750 Xn
80-14	4.0	0.6					SOR(40) SR(50) CC(2 R/W)1/		2	90		0	0	810-809 (92) 750
80-15	5.0	0.5		3.0			SOR(320) SR(237) CC(2 R/W)1/		2	157	400	0	0	750-740(559)
80-16	4.0	2.0					SOR(92) SR(75) CC(10)		10		167	1	0	750-740(177)
80-17	2.0		0.5				L(250)				250	0	0	745-705(250)
80-18	6.0	3.0		7.0			SOR(140) SR(150) CC(20) L(20)	20		220	90	1	100	718-701XY(100) 781-719WX(150) 371-372-370 XYn (80)
80-19	6.0	1.0					T(600)			300	300	0	100	824-825 XY(300) 721 X (300)
80-20	7.0	2.0		8.5			SOR(200) SR(150) CC(30) L(150)	30		400	100	1	100	371-372-370XYn(330) 718-781Xn(200)
80-21	7.0	3.0		4.0	1.0		SOR(200) SR(150) CC(15)	15		150	200	0	100	721XY(365)
80-22	8.0	1.0		5.0			SOR(225) SR(200) CC(25) L(100)	25		360	165	1	100	718-701XY(300) 718-701XYn(250)
80-23	4.0	1.5		5.0			SOR(150) SR(150) CC(10)	10		150	150	0	50	381-380(160) 719WX(150)
SUBTOTAL	112.8	23.3	5.3	37.5	1.0	0	SOR(2,233) SR(2,366) SF(1,736) IR(85) T(766) CC(384) L(590) SOR & T(260)	310	74	2,191	5,845	7	2,221	
Misc Vol 2/	7.2													
TOTAL	120.0													

1/ Right-of-Way
2/ Misc. Volume - Consists of timber sold as modifications to ongoing contracts, small salvage sales, and timber on permitted road or utility rights-of-way (R/W). Amounts shown are based on past experience of such sales in the JKSYUs. Since locations cannot be predicted, site specific impact analysis is limited to the regular sales listed.

Harvest System

Shelterwood Systems	Other Harvest Methods
SOR = Overstory Removal	IR = Individual Tree Removal
SF = Final Harvest	T = Commercial Thinning
SR = Regeneration Cut	L = Low Intensity Cut
	CC = Clear Cut

Table A-2

Timber Sale Plan FY 1981
Jackson & Klamath SYUs

Location Number	Vol. Million Bd. Ft.	Miles of Road Construction: New Surf.	New Unsurf.	Improved Surf.	Improved Unsurf.	Temp.	Harvest System (Acres)	Logging Methods: Clearcut Ac. Cable	Clearcut Ac. Cat	Partial Cut Ac. Cable	Partial Cut Ac. Cat	Residence Within One Mile	Est. Acres Burned	Soil Associations Type (Acres)
81-1	3.0	3.0					CC(80)	80				0	80	861(80)
81-2	6.2					0.1	SOR(105) SR(484)				589	0	300	809-810(589)
81-3	5.0	3.5					SOR&T (293) SR(53) L(79)			200	225	0	50	745-706(346) 706-36(79)
81-4	4.3	4.0					SOR(438) SR(245) IR(30)			239	474	0	250	882-880(400) 882(313)
81-5	5.0		1.5			0.3	SOR(138) IR(100) CC(100)		100		238	0	50	882-880(338)
81-6	9.5	3.3					SOR(342) T(254)			40	556	0	0	810-809(321) 882-880(275)
81-7	4.7					0.1	SOR(363)				363	0	100	880(200) 882-880(163)
81-8	1.2					0.4	T(67)				67	0	0	809-810(67)
81-9	2.4					1.0	SR(204)				204	0	100	809-810(204)
81-10	2.9						SOR(115)				115	0	50	810-809(115)
81-11	3.0	1.0		1.0			SR(133) CC(10)		10	65	68	1	0	740-750(63) 750(80)
81-12	1.5	0.5		1.0			SR(30) CC(27) T(40)		27		70	0	22	706-745(97)
81-13	9.0			3.0			SR(386) CC(35) T(87)	35		165	308	0	35	371-372-370(400) 741-731(108)
81-14	9.5	3.0		3.0			SOR(239) SR(3010 T(80) CC(20)		20	20	600	0	0	750XW(640)
81-15	5.0	1.5					SR(512) CC(62) L(18)	54	8	500	30	0	54	731-732XY(592) 731-732XYn
81-16	2.0		1.0				CC(5) L(184)		5		184	1		745Wn(189)
81-17	9.0	2.0		5.0			SOR(200) SR(350) CC(30)	30		350	200	0	200	371-372-370XY(400) 381-380X(180)
81-18	8.0	8.0					SOR(200) SR(300) CC(20)	10	10	300	200	1	150	718-701XY(450) 719-781WX(70)
81-19	8.0	1.0		7.0			SOR(50) SR(200) CC(25)	25		200	50	0	100	722X(75) 721XYn(200)
81-20	3.0			5.0			SOR(100) SR(250) CC(10) L(60)	10		310	100	1	25	718-781XY(100) 718-781XYn(240) 719Yn(80)
81-21	7.0			2.0			SOR(350) SR(150) CC(15)	15		400	100	1	50	372-371Yn(115) 718-781XY(400)
81-22	3.0	1.0		3.0			SOR(125) CC(10) SR(125) L(100)	10		100	250	1	75	718-781XY(200) 718-701Yn(80) 718-701XY(80)
SUBTOTAL	112.2	31.8	2.5	30.0	0	1.9	SOR(2,765) SR(3,723) SF(0) IR(130) T(528) CC(449) L(441) SOR&T-293	269	180	2,889	4,991	6	1,681	
Misc Vol 1/	7.8													
TOTAL	120.0													

1/ Misc. Volume - Consists of timber sold as modifications to ongoing contracts, small salvage sales, and timber on permitted road or utility rights-of-way (R/W). Amounts shown are based on past experience of such sales in the JKSYUs. Since locations cannot be predicted, site specific impact analysis is limited to the regular sales listed.

Harvest System

Shelterwood Systems	Other Harvest Methods
SOR = Overstory Removal	IR = Individual Tree Removal
SF = Final Harvest	T = Commercial Thinning
SR = Regeneration Cut	L = Low Intensity Cut
	CC = Clear Cut

Table A-3

Timber Sale Plan FY 1982
Jackson & Klamath SYUs

Location Number	Vol. Million Bd. Ft.	Miles of Road Construction: New Surf.	New Unsurf.	Improved Surf.	Improved Unsurf.	Temp.	Harvest System (Acres)	Logging Methods: Clearcut Ac. Cable	Clearcut Ac. Cat	Partial Cut Ac. Cable	Partial Cut Ac. Cat	Residence Within One Mile	Est. Acres Burned	Soil Associations Type (Acres)
82-1	4.6					0.7	SOR(53) SR(307)			41	319	0	250	809-810(360)
82-2	5.0	2.7					SR(281) L(51)			332		0	100	840-842(332)
82-3	5.0	5.2		1.3			SR(269) CC(54)	54		88	181	0	100	840-842(161) 850(162)
82-4	6.4					0.3	SOR(365) SR(160)				525	0	160	882-880(525)
82-5	7.0						SOR(263) SR(294)				557	0	300	809-810(462) 882-880(95)
82-6	7.0						SOR(638)				638	0	150	809-810(138) 882-880(500)
82-7	3.8	2.4					SOR(283) IR(179) T(60)			97	425	0	150	810-809(375) 882(147)
82-8	2.7						SR(147)				147	0	147	882-880(147)
82-9	2.7						SOR(90) SR(210) T(20)				320	0	210	809-810(120) 810-809(140) 882(60)
82-10	0.9						SR(64) T(20)				84	0	50	810-809(84)
82-11	5.0						CC(120)	120				1	120	740-750Xn(120)
82-12	7.0	3.0					SOR(266) L(25) SR(2130 CC(20)		R/W 20		504	1	0	750-740WXn(24) 750(500)
82-13	4.0	3.7					SF(120) CC(20)		R/W 20	100	20	0	0	371-372-370XYn(140)
82-14	6.0		0.5				SOR(645)			35	610	0	0	750(645)
82-15	5.0			1.0			SR(520)				520	0	0	706-745(520)
82-16	2.0	1.0		4.0			CC(5) T(195)		R/W	100	95	0	0	371-372-370XY(200)
82-17	8.0	1.5		4.0			SOR(100) SR(200) CC(25)	25		200	100	0	100	721X(150) 721XY(175)
82-18	3.5	0.5		3.0			SOR(175) SR(175) CC(10) L(150)	10		350	150	1	100	718-781XY(200) 718-781XYn(260) 719-Wn(50)
82-19	6.0			1.0		-	SOR(20) SR(290) CC(25)	25		150	160	0	50	380-382WX(200) 371-372-370XYn(135)
82-20	8.0	8.0	1.5				SOR(150) SR(150) CC(15) L(200)	15		400	100	0	0	370-382-371XYn(100) 718-701XY(200) 718-701Yn(165) 721-XYn(50)
82-21	8.0	1.0		6.0			SOR(250) SR(250) CC(15) L(150)	15		400	250	0	150	370-382-371XW(300) 371-372-370XY(100) 371-372-370XYn(165) 722-W(100)
82-22	6.0						SOR(75) SR(200) CC(10)	10		200	75	0	0	722-W(60) 770-R XY(225)
SUBTOTAL	113.6	28.5	1.5	16.8	0	1.0	SOR(3,373) SR(3,730) SF(120) IR(179) T(295) CC(319) L(576) SOR&T(0)	274	45	2,493	5,780	3	2,137	
Misc Vol 1/	6.4													
TOTAL	120.0													

1/ Misc. Volume - Consists of timber sold as modifications to ongoing contracts, small salvage sales, and timber on permitted road or utility rights-of-way (R/W). Amounts shown are based on past experience of such sales in the JKSYUs. Since locations cannot be predicted, site specific impact analysis is limited to the regular sales listed.

Harvest System

Shelterwood Systems
SOR = Overstory Removal
SF = Final Harvest
SR = Regeneration Cut

Other Harvest Methods
IR = Individual Tree Removal
T = Commercial Thinning
L = Low Intensity Cut
CC = Clear Cut

Appendix B

Annual Herbicide Plan

The following is illustrative of an annual herbicide program for the JKSYUs. It was developed for fiscal year 1979, but not implemented. Table B-1 shows the various treatments, i.e., combinations of chemicals and carrier for target species encountered in each specific area. The location of treatment areas is shown on the large map (Figure A-1) located in the pocket on the back cover of this document.

Table B-1
Jackson and Klamath Herbicide Program Proposed for FY 1979

Treatment Number	Target Pest	Purpose	Herbicide	Application Method	Lbs. Actual Chemical/Ac.	Spray Formulation	Appl. Rate (gal/ac)	No. of Areas	Range of Size (Acres)	Average Size (Acres)	Season of Application	Total Pounds Chemical	Total Acres
1	perennial grass	release site prep.	dowpon	backpack sprayer	5# dowpon	10#/100 gal.	50 gal.	10	10-50	25	Apr-May	1,500	300
2	grass	site prep.	atrazine dowpon	helicopter	4# atrazine 4# dowpon	4# + 4# in 10 gal. water	10 gal.	9	10-80	30	Apr-May	2,560	320
3	grass	site prep.	atrazine	helicopter	4# atrazine	4# in 10 gal. water	10 gal.	12	10-50	25	Sep-Nov	1,600	400
4	manzanita & ribes	site prep.	2,4-D	helicopter	3# 2,4-D	3#s 2,4-D 3 qts. fuel oil 10 gal. water	10 gal.	7	10-50	25	Apr-May	555	185
6	ceanothus chinkapin willow	conifer release	2,4-D	helicopter	3# 2,4-D	3#s 2,4-D 2 qts. fuel oil 8 3/4 gal. water	10 gal.	4	20-45	31	Mar-May	372	124
7	vine maple deer brush hazel, cherry	site prep.	Banvel	helicopter	4# Banvel	1 gal. Banvel 4 gal. fuel oil	10 gal.	1	45	45	Mar-May	180	45
8	madrone	Conifer release	2,4-D	helicopter	2# 2,4-D	2#s 2,4-D 2 qts. fuel oil 9.6 gal. water	10 gal.	1	187	187	Mar-May	374	187
9	madrone live oak hazel	conifer release	2,4-D	helicopter	3# 2,4-D	3#s 2,4-D 3 qts. fuel oil 8 1/2 gal. water	10 gal.	4	12-18	15	March	204	68
10	vine maple deer brush hazel, cherry	site prep.	Roundup	helicopter	2# Roundup	2 qts. Roundup 8 1/2 gal. water	10 gal.	19	12-45	17	Sep-Nov	636	318
11	grass	site prep.	atrazine	helicopter	5# Atrazine	5# Atrazine 10 gal. water	10 gal.	25	10-50	18	Feb-Apr	2,195	439
12	snowbrush chinkapin hazel	conifer release	Roundup	helicopter	1-1/2# Roundup	1/2 qt. Roundup 8 1/2 gal. water	10 gal.	3	10-60	40	Aug-Sep	175.5	119
13	chinkapin deerbrush madrone snowbrush	conifer release	Roundup	helicopter	1-1/2# Roundup	1-1/2# Roundup 9 1/2 gal. water	10 1/2 gal.	4	10-40	24	Aug-Sep	147	98
17	grass broadleaf weeds	conifer release	atrazine	helicopter	5#s Atrazine	5# Atrazine 20 gal. water	20 gal.	3	10-60	45	Sep-Oct Feb-Mar	675	135
18	ceanothus	conifer release	2,4-D	helicopter	3# 2,4-D	3# 2,4-D 9 1/4 gal. water	10 gal.	2	27-33	30	Aug-Sep	180	60

Appendix C

TPCC Class Criteria

Forest Land. By definition, forest land is land that is now, or is capable of becoming, at least 10 percent stocked with forest trees (native, woody plants capable of attaining heights of at least 20 feet) and has not been developed for non-timber use. Approximately 440,650 acres of the Jackson and Klamath SYUs fall into this category. Forest land is further classified as follows:

Commercial Forest Land. Forest land that is now producing or is capable of producing at least 20 cubic feet per acre per year of commercial coniferous tree species. Commercial forest land constitutes 354,550 acres in the JKSYUs.

Problem Sites. A subclass of commercial forest land which identifies problems due to 1) adverse location, 2) fragile areas, and 3) problem reforestation areas. This subclass of land is either withdrawn from the timber production base or is restricted to or from certain management practices.

Adverse Location. Problem sites which, because of their physical isolation, are difficult or impossible to manage for sustained yield timber production. Most problem sites classified as adverse location will be withdrawn from the timber production base due to the lack of special techniques to improve geographic accessibility.

Fragile Areas. Problem sites whose timber growing potential is easily reduced or destroyed; e.g., loss of timber growing potential may result from soil erosion and mass wasting. These sites may be restricted if special techniques are available to protect the site from damage due to road construction, logging activities, etc. If such special techniques are not available, the site is withdrawn from the timber production base.

Problem Reforestation Areas. Problem sites with lands upon which standard reforestation treatments, following clearcutting or shelterwood cutting, are expected to result in either 1) an "unstocked" condition after 5 years, or 2) a "stocked-unestablished" condition after 15 years.

Non-Problem Sites. Commercial forest land that is not classified as Adverse Location, Fragile Site, or Problem Reforestation Area.

Non-Commercial Forest Land. Land which is not capable of yielding at least 20 cubic feet of wood per acre per year of commercial species, or land which is capable of producing only non-commercial tree species. These lands are withdrawn from the timber production base. Approximately 86,100 acres fall into this category in the JKSYUs.

Low Site. Non-commercial forest land which is not capable of yielding at least 20 cubic feet of wood per acre per year of commercial species.

Non-Commercial Species. Non-commercial land on which only non-commercial tree species are capable of growing. Non-commercial species include all hardwoods, whether merchantable or non-merchantable.

Non-Forest Land. This includes land that has been developed for non-timber uses or land that is incapable of being 10 percent stocked with forest trees.

Examples of non-forest land are roads, rock outcrops, urban areas, and resort areas. These lands are automatically excluded from the timber production base. The Jackson and Klamath SYUs contained 47,610 acres of land in the non-forest category when the TPCC was conducted.

Appendix D

Recommended Watershed Practices

For

BLM-Administered Lands in the Jackson-Klamath Master Units

Each of the following general units is delineated on the MFP Watershed Activity Recommendations Overlay. Recommended practices and the reasons for implementing the practices are given for all major management activities that influence water quality. The recommended practices are guidelines only and should be used in conjunction with on-site investigations to determine the specific practice that will minimize water quality degradation and reduce losses in site productivity.

A. Alluvial Land Association (Shown as W-6 on MFP Step 1 Overlay)

Recommended Practices

1. Locate roads above the flood plain. Where it is necessary to construct roads within the flood plain, design the road to withstand inundation by rapidly flowing floodwaters. Place rock riprap on both the upstream and downstream sides of the road. Elevate the road above anticipated floodwaters using rock fill.

Reason

The major limitation associated with this unit is the frequency and duration of flooding of the area adjacent to stream channels. Roads located in the flood plain are subject to inundation and deterioration by floodwater. Rock fill and riprap will give more roadbed stability.

B. (36) Witzel - (R) Rock Land Association (W-7 on MFP Step 1 Overlay)

Recommended Practices

1. Clearcutting and Removal of Brush or Hardwoods

   Partial cut or avoid cutting on slopes exceeding 70 percent (especially critical on droughty south and west exposures).

   Use a suspension cable or aerial system for harvesting timber.

   Minimize downhill yarding.

   Limb all trees before yarding.

2. Tractor Logging on Shallow Soils

   Avoid tractor logging where shallow gravelly soils occur (i.e., on ridge crest and steep slopes).

3. Alternatives to Burning for Site Preparation

   Use alternatives to burning, such as herbicides, in site preparation.

4. Road Construction Through Steep Areas

   Confine roads to slopes less than 70 percent. Roll the road grade, taking advantage of stable positions (i.e., ridges, saddles, and natural benches).

   End haul excavated materials on slopes exceeding 70 percent which would otherwise be sidecast during excavation, to a safe disposal site (i.e., ridge crest, saddle, natural bench).

5. Road Construction Through Fractured Bedrock

   Avoid high steeply sloping cuts in highly fractured bedrock. Locate and design road to minimize heights of cuts.

Reasons

1. Clearcutting or removing brush and hardwoods on slopes in excess of 70 percent will expose soil to raindrop splash erosion and initiate soil raveling. The soil fines are removed and the available water capacity is reduced (especially critical on droughty south and west exposures). Once these processes begin, it is difficult to reestablish protective vegetative cover.

2. Tractor logging in ridge crests and steep slopes occupied by shallow gravelly soils will remove the duff layer and surface soil, which protects the underlying soil layer from erosion by water and raveling. Removing the duff layer and surface soil will reduce site productivity and degrade water quality.

3. Broadcast burning on steeply sloping south and west exposures will also remove the duff layer, thereby promoting excessive erosion and reducing site productivity.

4. Road construction on slopes exceeding 70 percent produces very gravelly sidecast material that buries downslope vegetation and creates a droughty condition, reducing site quality. Sidecast material can overload the fill slope and cause subsequent failure.

5. High, steeply sloping road cuts in fractured bedrock are most susceptible to rockfall.

C. 371-372-370 Association (W-8 on MFP Step 1 Overlay)

Recommended Practices

1. Clearcutting and Removal of Brush or Hardwoods

Partial cut or avoid cutting on slopes exceeding 70 percent.

Use a suspension cable or aerial harvesting system.

Directional fall trees to the lead.

Limb all trees before yarding.

2. Timber Harvest and Site Preparation on Shallow Soils

Avoid tractor logging where shallow gravelly soils occur (i.e., on ridge crests and steep slopes).

3. Site Preparation on Shallow Sites

Use alternatives to burning, such as herbicides, in site preparation.

4. Timber Harvest Site Preparation on Slide-prone Areas

Partial cut using a full suspension yarding system. Actively moving areas or slide-prone areas traversed by roads would not be harvested.

5. Road Construction Through Steep Areas

Confine roads to slopes less than 70 percent. Roll the road grade taking advantage of stable positions (i.e., ridges, saddles and natural bridges).

6. Road Construction Through Dipped Bedding Planes

Locate roads through areas where the bedding planes or weathering surfaces are not inclined with the slope. Existing road cuts in the area of proposed road location offer helpful clues to the orientation of the bedding planes.

Reasons

1. Clearcutting or removing brush or hardwood on very steeply sloping positions exposes the soil to raindrop splash erosion and initiates soil raveling. The soil fines are removed, and the available water capacity is reduced. Once these processes begin, it is difficult to reestablish a protective vegetative cover.

2. Tractor logging on ridge crests and steep slopes occupied by shallow gravelly soils will remove the duff layer, which protects the underlying soil from erosion by water and gravity. Removal of the duff layer, followed by reduction in soil fines, will reduce site productivity and degrade water quality.

3. Broadcast burning on shallow gravelly soils on steeply sloping terrain will remove the duff layer, thereby promoting excessive erosion and reducing site productivity. Reduction in site productivity is most significant on south and west exposures.

4. Clearcutting, when combined with road construction on steep sideslopes underlain by deep loamy or clayey overburden, will increase massive failures.

5. Road construction on slopes exceeding 70 percent produces very gravelly sidecast material that buries downslope vegetation and creates a droughty condition resulting in reduced site quality. Sidecast can overload fill slopes and cause road failures. Massive failures occur most frequently on the steepest headwalls.

6. Roads constructed through steeply sloping terrain where bedding planes or weathering surfaces are inclined with the slope are subject to massive failure.

D. 381-(380) Pollard Association (W-9 on MFP Step 1 Overlay)

Recommended Practices

1. Tractor Logging

Confine tractor logging to slopes less than 35 percent.

Limit period of operation to when the soil moisture content is below 25 percent.

Lay out skid trails before falling.

Require directional falling to skid trails.

All primary skid trails should be waterbarred. Rip as well as waterbar skid trails following final removal at driest time of year (July 15 through September 15). Rip to a depth of 12 to 15 inches with spacing equal to depth. Waterbars should be spaced at 25 to 100 foot intervals based on natural slope.

Consider cable systems or low ground pressure skidders.

2. Harvesting Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying

trees to determine cause of insect infestations. Disturbances caused by tractor logging and road construction may increase infestations and root rot, which reduces mechanical support and promotes massive failures. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems).

3. Timber Harvest in Boggy Areas

Allow no tractor logging in boggy areas.

4. Road Construction on Unstable Areas

Locate roads on stable positions such as ridges, natural benches, and gentle, even slopes. Avoid seeps, old landslides, and oversteepened slopes.

Round off upper 2 feet of cutslope to minimize sloughing.

5. Sidecast Material from Road Construction

End haul material that would otherwise be sidecast during road construction to a safe disposal site. Shape and revegetate disposal site.

6. Road Construction Through Wet Areas

Locate roads on well-drained soil types. Avoid wet areas by rolling the road grade.

Place perforated pipe or an open drainage ditch upslope from the cutbanks (where crossing wet areas) to intercept and divert surface and subsurface water. These practices should be employed only when alternate routes are not available.

Ramp over wet areas using large rocks as a base where cuts are not required.

Reasons

1. Tractor logging removes the duff layer and results in soil compaction, especially when soils are moist, causing a reduction in infiltration and initation of overland flow on skid trails and subsequent reduction in site productivity. Overland flow dislodges and transports soil particles causing water quality degradation.

2. Harvesting bug-killed timber may result in an increase in mass failure incidents. Dead and dying timber is often on unstable positions created by a seasonal watertable that weakened the timber and encouraged insect infestation.

3. Tractor logging in boggy areas may alter or intercept subsurface waterflow, causing a rise in the water table and a subsequent reduction in site productivity. High water tables restrict rooting and weaken native vegetation.

4. Roads constructed on oversteepened slopes, hummocky (uneven) topography, and across seeps and old landslides will substantially increase the occurrence of massive failures.

5. Sidecast material from road construction when saturated, causes roadfill failures.

6. Roads constructed through wet areas often experience prism failure due to a poor bearing surface.

E. (706) Medco - (36) Witzel - 705 Association (W-10 on MFP Step 1 Overlay)

Recommended Practices

1. Disturbance of Clayey Soils

Use low pressure ground skidder when moisture contact is less than 25 percent. Skid trails and landings should be ripped following final harvest at driest time of the year.

Require that blades not be used during yarding.

Confine skidder yarding to slopes less than 35 percent.

Plant or seed skid roads prior to fall rains.

Lay out skid trails prior to timber harvest.

2. Harvesting Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestation. Disturbances caused by tractor logging and road construction may increase infestations and root rot, which reduces mechanical support and promotes massive failures. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems).

Drain areas showing evidence of a high water table.

3. Interrupting Surface and/or Subsurface Water

Allow no tractor logging in boggy areas or landscapes where water accumulates (i.e., swales, drainage ways, etc.). Locate skid trails on ridges or other convex positions.

4. Clearcutting and Removal of Brush or Hardwoods

Partial cut or avoid cutting on slopes exceeding 70 percent.

Use a suspension cable or aerial harvesting system.

Directional fall trees to the lead.

Limb all trees before yarding.

5. Tractor Logging on Shallow Soils

Avoid tractor logging where shallow soils occur (i.e., on ridge crest and steep slopes).

6. Alternatives to Burning for Site Preparation

Use alternatives to burning, such as herbicides, in site preparation.

7. Road Construction Through Unstable Areas

Locate roads on stable positions such as ridges, natural benches, and gentle even slopes. Avoid seeps, old landslides, and slopes in excess of 70 percent.

8. Sidecast from Road Construction

End haul materials which would otherwise be sidecast during excavation to a safe disposal site (i.e., ridge crest, saddle, or natural bench). Shape and revegetate disposal site.

9. Road Construction Through Wet Areas

Locate roads on well-drained soil types. Avoid wet areas by rolling the road grade.

Place perforated pipe or an open drainage ditch upslope from the cutbanks, where crossing wet areas, to intercept and divert surface and subsurface water. These practices should be employed only when alternate routes are not available.

Ramp over wet areas using large rocks as a base where cuts are not required.

Construct roads during period of year when the soil moisture content is lowest (late summer and early fall).

10. Road Construction Through Steep Areas

Confine roads to slopes less than 70 percent. Roll the road grade taking advantage of stable position (i.e., ridges, saddles, and natural benches).

End haul excavated materials on slopes exceeding 70 percent, which would otherwise be sidecast during excavation, to a safe disposal site (i.e., ridge crest, saddle, or natural bench).

11. Road Construction Through Fractured Bedrock

Avoid high steeply sloping cuts in highly fractured bedrock. Locate and design roads to minimize heights of cuts.

Reasons

1. Tractor logging removes the duff layer and results in soil compaction, causing a reduction in infiltration and initiation of overland flow on skid trails and subsequent reduction in site productivity. Overland flow dislodges and transports colloidal sized particles, causing water quality degradation.

2. Harvesting bug-killed timber may result in an increase in mass failure incidents. Dead and dying timber is often on unstable positions created by a water table that weakened the timber and encouraged insect infestation.

3. Tractor logging in boggy areas may alter or intercept subsurface water flow, causing a rise in the watertable and subsequent reduction in site productivity. High water tables restrict rooting and weaken native vegetation.

4. Clearcutting or removing brush or hardwood on very steeply sloping positions exposes the soil to raindrop splash erosion and initiates soil raveling. The soil fines are removed and the available water capacity is reduced. Once these processes begin, it is difficult to reestablish a protective vegetative cover.

5. Tractor logging on ridge crests and steep slopes occupied by shallow gravelly soils will remove the duff layer and surface soil which protects the underlying soil from erosion by water and gravity. Removing the duff layer, followed by reduction in soil fines, will reduce the site productivity and degrade water quality.

6. Broadcast burning on steeply sloping terrain will also remove the duff layer thereby promoting excessive erosion and reducing site productivity (most significant on south and west exposures).

7. Roads constructed on oversteepened slopes, hummocky (uneven) topography, and across seeps and old landslides will substantially increase the occurrence of massive failures.

8. Sidecast material from road construction, when saturated, causes roadfill failures.

9. Roads constructed through wet areas often experience prism failures due to a poor bearing surface.

10. Road construction through shallow, gravelly soils on slopes exceeding 70 percent produces very gravelly sidecast material that buries downslope vegetation and creates a droughty condition, reducing site productivity. Sidecast can overload fill slopes and cause road failure. Massive failures occur most frequently on the steepest headwalls.

11. High, steeply sloping road cuts in fractured bedrock are most susceptible to rockfall.

F. (716) Debenger - (715) Brader Association (W-11 on MFP Step 1 Overlay)

Recommended Practices

1. Tractor Logging on Shallow Soils

Avoid tractor logging where shallow gravelly soils occur (i.e., on ridge crest and steep slopes).

2. Alternatives to Burning for Site Preparation

Use alternatives to burning, such as herbicides, in site preparation.

3. Road Construction Through Steep Areas

Confine roads to slopes less than 70 percent. Roll the road grade, taking advantage of stable positions (i.e., ridges, saddles, and natural benches.).

End haul excavated materials on slopes exceeding 70 percent which would otherwise be sidecast during excavation to a safe disposal site (i.e., ridge crest, saddle, natural bench).

4. Road Construction Through Dipped Bedding Planes

Locate roads through areas where the bedding planes or weathering surfaces are not inclined with the slope. Existing road cuts in the area of proposed road location offer helpful clues to the orientation of the bedding planes.

5. Road Construction Through Fractured Bedrock

Avoid high, steeply sloping cuts in highly fractured bedrock. Locate and design roads to minimize heights of cuts.

Reasons

1. Tractor logging on ridge crests and steep slopes occupied by shallow soils will remove the duff layer and surface soil which protects the underlying soil from erosion. Removal of the duff layer, followed by reduction in soil fines, will reduce site productivity and degrade water quality.

2. Broadcast burning on steeply sloping terrain will also remove the duff layer, thereby promoting erosive erosion and reducing site productivity.

3. Road construction on slopes exceeding 70 percent produces very gravelly sidecast material that buries downslope vegetation and creates a droughty condition, causing reduced site productivity.

4. Roads constructed through steeply sloping terrain where bedding planes or weathering surfaces are inclined with the slope are subject to massive failure.

5. High, steeply sloping road cuts in fractured bedrock are most susceptible to rockfall.

G. (718) Beekman - 701- (719) Association (W-12 on MFP Step 1 Overlay)

Recommended Practices

1. Clearcutting and Removal of Brush or Hardwoods

Partial cut or avoid cutting on slopes exceeding 70 percent (especially critical on droughty south and west exposures).

Use a suspension cable or aerial system for harvesting timber.

Limb all trees before yarding.

2. Tractor Logging on Shallow Soils

Avoid tractor logging where shallow gravelly soils occur (i.e., on ridge crest and steep slopes).

3. Alternatives to Burning for Site Preparation

Use alternatives to burning, such as herbicides or hand treatment, in site preparation.

4. Clearcutting on Steeply Sloping Clayey Overburden

Use selective logging systems on slopes exceeding 70 percent where road cuts reveal deep (40 inches or more) loamy or clayey overburden.

5. Tractor Logging on Clayey Soils

Limit time of operation to periods when soil moisture is below 25 percent. Skid trails and landings should be ripped following final harvest at the driest time of year.

Confine tractor yarding to slopes less than 35 percent.

Plant or seed skid trails prior to fall rains.

6. Road Construction Through Steep Areas

Confine roads to slopes less than 70 percent. Roll the road grade, taking advantage of stable positions (i.e., ridges, saddles, and natural benches). Shape and revegetate disposal area.

7. Road Construction Through Dipped Bedding Planes

Locate roads through areas where the bedding planes or weathering surfaces are not inclined with the slope. Existing road cuts in the area of proposed road location offer helpful clues to the orientation of the bedding planes.

8. Road Construction Through Fractured Bedrock

Avoid high steeply sloping cuts in highly fractured bedrock. Locate and design roads to minimize heights of cuts.

9. Road Construction Through Wet Areas

Locate roads on well-drained soil types. Avoid wet areas by rolling the road grade.

Place perforated pipe or an open drainage ditch upslope from the cutbanks (where crossing wet areas) to intercept and divert surface and subsurface water. These practices should be employed only when alternate routes are not available.

Ramp over wet areas using large rocks as a base where cuts are not required.

Reasons

1. Clearcutting or removal of brush or hardwood on very steeply sloping positions exposes the soil to raindrop splash erosion and initiates soil raveling. The soil fines are removed and the available water capacity is reduced. Once these processes begin, it is difficult to reestablish a protective vegetative cover.

2. Tractor logging on ridge crests and steep slopes occupied by shallow, gravelly soils will removed the duff layer and surface soil, which protects the underlying soil from erosion by water and gravity. Removing the duff layer, followed by reduction in soil fines, will reduce site productivity and degrade water quality.

3. Broadcast burning on steeply sloping terrain will also remove the duff layer, thereby promoting excessive erosion and reducing site productivity. Reduction in productivity is most significant on south and west exposures.

4. Clearcutting, when combined with road construction on steep sideslopes having deep loamy or clayey overburden, will increase massive failures.

5. Tractor logging on clayey Manzanita soils, when moist, will result in soil compaction causing a reduction in infiltration and initiation of overland flow on skid trails. Overland flow dislodges and transports soil particles, causing water quality degradation.

6. Road construction on slopes exceeding 70 percent produces very gravelly sidecast material that buries downslope vegetation and creates a droughty condition, reducing site productivity. Sidecast can overload fill slopes and cause road failures. Massive failures occur most frequently on the steepest headwalls.

7. Roads constructed through steeply sloping terrain where bedding planes or weathering surfaces are inclined with the slope are subject to massive failure.

8. High, steeply sloping raod cuts in fractured bedrock are most susceptible to rockfall.

9. Roads constructed through wet areas often experience prism failures due to poor bearing surface.

H. (718) Beekman - (781) Colestine - (719) Manzanita Association (W-13 on MFP Step 1 Overlay).

Recommended Practices

1. Clearcutting and Removal of Brush or Hardwoods

Partial cut or avoid cutting on slopes exceeding 70 percent (especially critical on droughty south and west exposures).

Use a suspension cable or aerial system for harvesting timber.

Minimize downhill yarding.

Limb all trees before yarding.

2. Tractor Logging on Shallow Soils

   Avoid tractor logging where shallow gravelly soils occur (i.e., on ridge crest and steep slopes).

3. Alternatives to Burning for Site Preparation

   Use alternative to burning, such as herbicides, in site preparation.

4. Clearcutting on Steeply Sloping Clayey Overburden

   Use partial cut logging systems on slopes exceeding 70 percent where road cuts reveal deep (40 inches or more) loamy or clayey overburden.

5. Tractor Logging on Clayey Soils

   Confine tractor logging to slopes less than 35 percent.

   Limit time of operation to periods when soil moisture is below 25 percent. Skid trails and landings should be ripped following final harvest at the driest time of year.

   Plant or seed skid trails prior to fall rains.

6. Road Construction Through Steep Areas

   Confine roads to slopes less than 70 percent. Roll the road grade, taking advantage of stable positions (i.e., ridges, saddles, and natural benches).

   End haul excavated materials on slopes exceeding 70 percent, which would otherwise be sidecast during excavation, to a safe disposal site (i.e., ridge crest, saddle, natural bench).

7. Road Construction Through Dipped Bedding Planes

   Locate roads through areas where the bedding planes or weathering surfaces are not inclined with the slope. Existing road cuts in the area of proposed road location offer helpful clues to the orientation of the bedding planes.

8. Road Construction Through Fractured Bedrock

   Avoid high steeply sloping cuts in highly fractured bedrock. Locate and design roads to minimize heights of cuts.

9. Road Construction Through Wet Areas

   Locate roads on well-drained soil types. Avoid wet areas by rolling the road grade.

   Place perforated pipe or an open drainage ditch upslope from the cutbanks where crossing wet areas to intercept and divert surface and subsurface water. These practices should be employed only when alternate routes are not available.

   Ramp over wet areas using large rocks as a base where cuts are not required.

Reasons

1. Clearcutting or removing brush and hardwoods on slopes in excess of 70 percent will expose soil to raindrop splash erosion and initiate soil raveling. The soil fines are removed and the available water capacity is reduced (especially critical on droughty south and west exposures). Once these processes begin, it is difficult to reestablish protective vegetative cover.

2. Tractor logging on ridge crests and steep slopes occupied by gravelly soils will remove some surface soil and the duff layer, which protects the underlying soil from erosion by water and raveling. Removing the duff layer and surface soil will reduce site productivity and degrade water quality.

3. Broadcast burning on gravelly soils on steeply sloping south and west exposures will remove the duff layer thereby promoting erosion and reducing site productivity.

4. Clearcutting on shallow gravelly soils on steeply sloping landscape underlain by deep clayey overburden will increase massive failures especially where roads traverse the clearcut unit.

5. Tractor logging on clayey soils (Manzanita soils) when moist will result in soil compaction, causing a reduction in infiltration and initiation of overland flow on skid trails. Overland flow dislodges and transports soil paricles causing water quality degradation.

6. Road construction on slopes exceeding 70 percent produces very gravelly sidecast material that buries downslope vegetation and creates a droughty condition resulting in reduced site quality. Sidecast can overload fill slopes and cause road failures.

7. Roads constructed through steeply sloping terrain where bedding planes or weathering surfaces are inclined with the slope will have incidents of massive failure.

8. High, steep road cuts in fractured bedrock are most susceptible to rockfall. Rockfall fills ditches and plugs culverts, which increases incidents of road failures.

9. Roads constructed through wet areas often experience prism failures due to a poor bearing surface.

I. (721) Siskiyou - (722) Holland Association (W-14 on MFP Step 1 Overlay)

Recommended Practices

1. Clearcutting on or above Debris Slide-Prone Areas

Partial cut using a full suspension yarding system. Actively moving areas traversed by roads should not be harvested.

2. Clearcutting or Removing Bursh or Hardwoods

Partial cut using full or partial suspension systems on slopes exceeding 70 percent. Most critical conditions exist on south and west exposures where the annual rainfall is less than 35 inches.

Minimize downhill yarding.

Limb all trees before yarding.

3. Tractor Logging on Slopes over 20 Percent

Tractor logging should be limited to slopes less than 20 percent. Blades should be removed from tractors during logging operations.

Skid roads should be waterbarred and revegetated immediately following logging.

4. Evaluate Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestation. Disturbances caused by tractor logging and road construction may increase infestations which weaken or ultimately kill tree roots, thereby promoting massive failures through loss of mechanical support. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems).

5. Broadcast Burning on Harvested Areas

Herbicides or other means should be used as alternatives to burning or scarification. Do not spray adjacent to live streams.

6. Road Construction on Slopes Exceeding 70 Percent

Avoid locating roads on slopes exceeding 70 percent and on areas exhibiting instability. Roll the road grade, taking advantage of natural benches, ridges, and other stable positions.

7. Fills Crossing Drainages

Fills must be designed for overtopping and for stability when saturated. Rock fills are simple and effective.

Consider bridging across debris channels.

8. Granitic Soils Subject to Piping

All fills should be compacted to a degree consistent with design standards and material properties.

9. Large Cuts and Fills Which Produce Considerable Sidecast

Cutslopes should generally be as steep as possible consistent with subsurface strength conditions. Multiple cutslopes should be constructed when weak overburden requires it, and it is practical (i.e., natural ground slope makes it feasible). Buttressing should be considered for cutslopes with stability problems.

10. Off-Road Vehicle (ORV) Use

ORV's (4-wheel drives and motorbikes) should be limited to surfaced roads. Discourage travel on skid roads, unsurfaced haul roads, and unroaded areas.

11. Granite Pits

Shape, mulch, seed, and fertilize granite material sites prior to abandonment. Refertilize at 3 to 5-year intervals.

Droughty conditions may require watering to maintain vegetation.

Construct and maintain sediment tramps on all streams within the watershed influenced by granite pits.

Lay out skid trails prior to timber harvest.

Plant or seed skid trails prior to fall rains.

Reasons

1. Clearcutting on or above debris slide prone areas will substantially increase the probability of massive failure.

2. Clearcutting or removing brush or hardwoods on very steeply sloping ground exposes the soil to raindrop splash erosion and initiates soil raveling. The soil fines are removed and the available water capacity is reduced. Once these processes begin, it is difficult to reestablish protective vegetative cover.

3. Tractor logging on slopes over 20 percent results in surface soil displacement and destruction of protective vegetation. Bare, compacted, and disturbed soils are subject to erosion and subsequent water quality degradation.

4. Harvesting bug-killed timber may increase the mass failure hazard. Dead and dying timber is often on unstable positions created by a watertable that weakened the timber and encouraged insect infestation.

5. Broadcast burning on harvested areas will remove the duff layer, thereby promoting excessive erosion and reducing site productivity.

6. Road construction on slopes exceeding 70 percent which requires deep fills and/or high cuts, and on those areas showing evidence of instability, will result in substantial increases of massive failure.

7. All fills crossing drainages within this soil association must be viewed as acting as debris dams during their life. Slides occurring in drainageways will plug culverts resulting in road failures.

8. Granitic soils are subject to piping in uncompacted fills.

9. Large cuts and fills produce considerable sidecast which buries downslope vegetation and creates a droughty condition. This reduces site quality.

10. ORV use increases overland flow by removing the protective duff layer and compacting of the soil, and thus increases erosion. Granite soils lack sufficient cohesion due to small amounts of clay and silt, so individual particles are easily detached and transported by water.

11. Granite bedrock, when exposed to weathering by water and temperature changes, rapidly deteriorates and is subject to detachment and transport, which can result in sediment reaching streams.

J. <u>(731) Straight - (741) Freezner Association (W-15 on MFP Step 1 Overlay)</u>

<u>Recommended Practices</u>

1. <u>Clearcutting and Removal of Brush or Hardwoods</u>

Partial cut or avoid cutting on slopes exceeding 70 percent.

Use a suspension cable or aerial harvesting system.

Directional fall trees to the lead.

Limb all trees before yarding.

2. <u>Tractor Logging on Shallow Soils</u>

Avoid tractor logging where shallow soils occur (i.e., on ridge crests and steep slopes).

3. <u>Alternatives to Burning for Site Preparation</u>

Use alternatives to burning, such as herbicides, in site preparation.

4. <u>Clearcutting on Slide Prone Areas</u>

Partial cut using a full suspension yarding system. Actively moving areas or slide prone areas traversed by roads should not be harvested.

5. <u>Disturbance of Clayey Soils</u>

Use low pressure ground skidder when moisture content is less than 25 percent. Skid trails and landings should be ripped following final harvest at driest time of year.

Require that blades not be used during yarding.

Plant or seed skid trails prior to fall rains.

6. <u>Harvest Bug-Killed Timber</u>

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestation. Disturbances caused by tractor logging and road construction may increase infestations and root rot, which reduce mechanical support and promote massive failures. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems).

Drain areas showing evidence of a high water table.

7. <u>Tractor Logging in Boggy Areas</u>

Allow no tractor logging in boggy areas.

Confine skidder yarding to slopes less than 35 percent.

Lay out skid trails prior to timber harvest.

8. <u>Road Construction Through Steep Areas</u>

Confine roads to slopes less than 70 percent. Roll the road grade,

taking advantage of stable positions (i.e., ridges, saddles, and natural benches).

End haul excavated materials on slopes exceeding 70 percent, which would otherwise be sidecast during excavation, to a safe disposal (i.e., ridge crest, saddle, natural bench). Shape and revegetate disposal area.

9. Road Construction Through Dipped Bedding Planes

Locate roads through areas where the bedding planes or weathering surfaces are not included with the slope. Existing road cuts in the area of proposed road location offer helpful clues to the orientation of the bedding planes.

10. Road Construction Through Fractured Bedrock

Avoid high steeply sloping cuts in highly fractured bedrock. Locate and design roads to minimize heights of cuts.

11. Roads Constructed on Unstable Areas

Locate roads on stable positions such as ridges, natural benches, and gentle, even slopes. Avoid seeps, old landslides, and oversteepened slopes.

12. Road Construction Through Wet Areas

Locate roads on well-drained soil types. Avoid wet areas by rolling the road grade.

Place perforated pipe or an open drainage ditch upslope from the cutbanks (where crossing wet areas) to intercept and divert surface and subsurface water. These practices should be employed only when alternate routes are not available.

Ramp over wet areas using large rocks as a base where cuts are not required.

Reasons

1. Clearcutting or removing brush and hardwoods on slopes in excess of 70 percent will expose soil to raindrop splash erosion and initiate soil raveling. The soil fines are removed and the available water capacity is reduced (especially critical on droughty south and west exposures). Once these processes begin, it is difficult to reestablish protective vegetation cover.

2. Tractor logging on ridge crests and steep slopes occupied by shallow gravelly soils will remove the duff layer and surface soil, which protects the underlying soil layers from erosion by water and raveling. Removing the duff layer and surface soil will reduce site productivity and degrade water quality.

3. Broadcast burning on steeply sloping south and west exposures will also remove the duff layer, thereby promoting excessive erosion and reducing site productivity.

4. Clearcutting in unstable areas will increase massive failure, especially where roads traverse the clearcut unit.

5. Tractor logging on clayey soils removes the duff layer and results in soil compaction, causing a reduction in infiltration and initiation of overland flow on skid trails and a subsequent reduction in site productivity. Overland flow dislodges and transports soil particles, causing water quality degradation.

6. Harvesting bug-killed timber may result in an increase in mass failure incidents. Dead and dying timber is often on unstable positions created by a seasonal watertable that weakened the timber and encouraged insect infestation.

7. Tractor logging in boggy areas may alter or intercept subsurface water flow, causing a rise in the water table and a subsequent reduction in site productivity. High water tables restrict rooting and weaken native vegetation.

8. Road construction on slopes exceeding 70 percent produces very gravelly sidecast material that buries downslope vegetation and creates a droughty condition, resulting in reduced site production. Sidecast can cause overloading of the fill slope and subsequent failure.

9. Roads constructed through steeply sloping terrain where bedding planes or weathering surfaces are inclined with the slope are subject to massive failure.

10. High, steeply sloping road cuts in fractured bedrock are most susceptible to rockfall.

11. Roads constructed on oversteepened slopes, hummocky (uneven) topography, and across seeps and old landslides will substantially increase the occurrence of massive failures.

12. Roads constructed through wet areas often experience prism failures due to a poor bearing surface.

K. (745) Laurelhurst - (706) Medco Association (W-16 on MFP Step 1 Overlay)

Recommended Practices

1. Disturbance of Clayey Soils

Use low pressure ground skidder when moisture content is less than 25 percent. Skid trails and landings should be ripped following final harvest at driest time of year.

Require that blades not be used during yarding.

Confine skidder yarding to slopes less than 35 percent.

Lay out skid trails prior to timber harvest.

Plant or seed skid trails prior to fall rains.

2. Evaluate Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestation. Disturbances caused by tractor logging and road construction may increase infestations which weakens or ultimately kills tree roots, thereby promoting massive failures through loss of mechanical support. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems).

Drain areas showing evidence of a high water table.

3. Tractor Logging in Boggy Areas

Allow no tractor logging in boggy areas.

4. Roads Constructed on Unstable Areas

Locate roads on stable positions such as ridges, natural benches, and gentle, even slopes. Avoid seeps, old landslides, and over-steepened slopes.

5. Sidecast Material From Road Construction

End haul material that would otherwise be sidecast during road construction to a safe disposal site. Shape and revegetate disposal areas.

6. Roads Constructed Through Wet Areas

Locate roads on well-drained soil types. Avoid wet areas by rolling the road grade.

Place perforated pipe or an open drainage ditch upslope from the cutbanks (where crossing wet areas) to intercept and divert surface and subsurface water. These practices should be employed only when alternate routes are not available.

Ramp over wet areas using large rocks as a base where cuts are not required.

Reasons

1. Tractor logging removes the duff layer and results in soil compaction, causing a reduction in infiltation and initiation of overland flow on skid trails and subsequent reduction in site productivity. Overland flow dislodges and transports colloidal-sized soil particles, causing water quality degradation.

2. Harvesting bug-killed timber may result in an increase in mass failure incidents. Dead and dying timber is often in unstable positions created by a water table that weakened the timber and encouraged insect infestation.

3. Tractor logging in boggy areas may alter or intercept subsurface water flow, causing a rise in the water table and subsequent reduction in site productivity. High water tables restrict rooting and weaken native vegetation.

4. Roads constructed on oversteepened slopes, hummocky (uneven) topography, and across seeps and old landslides will substantially increase the occurrence of massive failures.

5. Sidecast material from road construction, when saturated, causes roadfill failures.

6. Roads constructed through wet areas often experience prism failures due to a poor bearing surface.

L. (750) Dumont - (740) Geppert Association (W-17 on MFP Step 1 Overlay)

Recommended Practices

1. Tractor Logging

Confine tractor logging to slopes less than 35 percent.

Limit period of operation to when soil moisture is below 25 percent.

Layout skid trails before timber harvest.

Require directional falling to skid trails.

All primary skid trails should be waterbarred. Rip and waterbar skid trails following final removal at driest time of year (July 15 through

September 15). Rip to a depth of 12 to 15 inches with spacing equal to depth. Waterbars should be spaced at 25 to 100 foot intervals based on natural slope.

2. Tractor Logging in Boggy Areas

Allow no tractor logging in boggy areas.

3. Sidecast Material From Road Construction

End haul material that would otherwise be sidecast during road construction to a safe disposal site. Shape and revegetate disposal areas.

4. Roads Constructed Through Wet Areas

Locate roads on well-drained soil types. Avoid wet areas by rolling the road grade.

Place perforated pipe or an open drainage ditch upslope from the cutbanks (where crossing wet areas) to intercept and divert surface and subsurface water. These practices should be employed only when alternate routes are not available.

Ramp over wet areas using large rocks as a base where cuts are not required.

Reasons

1. Tractor logging removes the duff layer and results in soil compaction, causing a reduction in infiltration and initiation of overland flow on skid trails and subsequent reduction in site productivity. Overland flow dislodges and transports colloidal-sized soil particles, causing water quality degradation.

2. Tractor logging in boggy areas may alter or intercept subsurface water flow, causing a rise in the water table and a subsequent reduction in site productivity. High water tables restrict rooting and weaken native vegetation.

3. Sidecast material from road construction, when saturated, causes road failures.

4. Roads constructed through wet areas often experience prism failures due to a poor bearing surface.

M. (770) Pearsoll -(R) Rock Land Association (Shown as W-18 on MFP Step 1 Overlay)

Recommended Practices

1. Disturbance of Shallow Clayey Soils

Partial cut using a full suspension system. Plant to reestablish ground cover on bare soil areas. Shallow rocky areas should not be logged.

Limit yarding to dry season of the year (generally June through October).

Minimize downhill yarding.

2. Tractor Logging on Clayey Soils

Use alternatives to tractor logging whenever possible to minimize ground disturbance and compaction. Consider cable systems or low pressure skidding.

Confine tractor logging to slopes less than 35 percent.

Tractor log only during the time of the year when the soil moisture content is below 25 percent.

Lay out skid trails before timber harvest.

Require directional falling to skid trails.

All primary skid trails should be waterbarred. Rip and waterbar skid trails following final removal at driest time of year (July 15 through September 15). Rip to a depth of 12 to 15 inches with spacing equal to depth. Waterbars should be spaced at 25 to 100 foot intervals based on natural slope.

Plant or seed skid roads prior to fall rains.

Require that blades not be used during yarding.

3. Interrupting Surface and/or Subsurface Water

Allow no tractor logging in boggy areas or landscapes where water accumulates (i.e., swamps, drainage ways, etc.). Locate skid trails on ridges or other convex positions.

4. Clearcutting on Slide Prone Areas

Partial cut using a full or partial suspension yarding system. Actively moving areas or slide prone areas traversed by roads should not be harvested.

5. Road Construction through Unstable Areas

Locate roads on stable positions such as ridges, natural benches, and gentle even slopes. Avoid seeps, old landslides, and slopes in excess of 70 percent.

6. Road Construction through Steep Areas

Avoid logging roads in steeply sloping areas dominated by rockland. Locate and design roads to minimize heights of cuts.

End haul materials which would otherwise be sidecast during excvavation to a safe disposal site (i.e., ridge crest, or natural bench). Shape and revegetate disposal areas.

7. Road Construction through Wet Areas

Locate roads on well drained soil types. Avoid wet areas by rolling the road grade.

Place perforated pipe or an open drainage ditch upslope from the cutbanks, where crossing wet areas, using large rocks as a base where cuts are not required. These practices should be employed only when alterntive routes are not available.

Construct roads during the period of year when the soil moisture content is lowest (generally late summer and early fall).

Reasons

1. Disturbance of the surface of shallow clayey soil derived from serpentine would result in indadequate vegetation cover to minimize erosion. Vegetation is difficult to establish because of a magnesium toxicity, which is impractical to correct.

2. Tractor logging on clayey soils derived from serpentine will cause compaction, resulting in reduced infiltration and increased overland flow. Eroded clay particles from these soils will stay in suspension causing water quality degradation on and off the site. Compaction will also reduce site productivity.

3. Tractor skid roads may interrupt surface and/or subsurface waterflow, resulting in an increase in landslide activity.

4. Clearcutting on or above debris slide prone slopes will substantially increase the probability of massive failure.

5. Road construction through unstable areas will greatly increase the probability of massive failure, i.e., slumps and earthflows.

6. Road construction through steeply sloping terrain dominated by rockland encourages rockfall and produces considerable sidecast. Sidecast material, being low in soil fines, is difficult to revegetate.

7. Roads constructed through wet areas often experience prism failures due to a poor bearing surface.

N. 809-810 Association (W-19 on MFP Step 1 Overlay)

Recommended Practices

1. Tractor Logging

Tractor log during winter when snow depth exceeds 1 foot.

Use low pressure ground skidder or horses when moisture content is less than 25 percent.

Lay out skid trails prior to timber harvest.

Confine ground lead systems to slopes less than 35 percent.

Skid trails and landings should be ripped and waterbarred following final harvest at driest time of year (July 15 through September 15). Rip to a depth of 12 to 15 inches with spacing equal to depth.

2. Bare Soil Areas Subject to Frost Heaving

Establish deep rooting native vegetation on bare soil aeas.

3. Road Cuts and Fills Subject to Frost Heaving

Minimize the heights of cuts and fills by rolling the grade and locating roads on ridges whenever possible.

Plant deep rooting vegetation on cuts and fills.

Place a straw mat or jute matting on areas that cannot be vegetated within one year following road construction.

Reasons

1. Tractor logging removes the duff layer and results in soil compaction, causing a reduction in infiltration and initiation of overland flow on skid trails and subsequent reduction in site productivity. Overland flow dislodges and transports colloidal-sized soil particles, causing water quality degradation.

2. Bare soil areas resulting from logging are subject to frost heave and burrowing animal activity. Frost heave and animal activity destroys

surface soil structure and allows soil particles to be dislodged and transported by surface runoff.

3. Road cuts and fills are subject to frost heaving and subsequent surface erosion by raveling and runoff.

O. 840-850-842 Association (W-20 on MFP Step 1 Overlay)

Recommended Practices

1. Clearcutting on Slide Prone Areas

Partial cut using a full suspension yarding system. Actively moving areas of slide prone areas traversed by roads should not be harvested.

2. Tractor Logging

Tractor log during winter when snow depth exceeds 1 foot.

Use low pressure ground skidder or horses when moisture content is less than 25 percent.

Lay out skid trails prior to timber harvest.

Confine ground lead systems to slopes less than 25 percent.

Skid trails and landings should be ripped and waterbarred following final harvest at driest time of year (July 15 through September 15). Rip to a depth of 12 to 15 inches with spacing equal to depth.

3. Harvesting Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestation. Disturbances caused by tractor logging and road construction may increase infestations which reduces mechanical support through root rot, thereby promoting massive failures. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems or low pressure ground skidders).

Drain areas showing evidence of a high water table.

4. Tractor Logging in Boggy Areas

Allow no tractor logging in boggy areas.

5. Bare Soil Areas Subject to Frost Heaving

Establish deep-rooting native vegetation on bare soil areas.

6. Roads Constructed on Unstable Areas

Locate roads on stable positions such as ridges, natural benches, and on gentle, even slopes. Avoid seeps, old landslides, and oversteepened slopes.

7. Sidecast Material From Road Construction

End haul material that would otherwise be sidecast during road construction to a safe disposal site. Shape and revegetate disposal areas.

8. Roads Constructed Through Wet Areas

Locate roads on well-drained soil types. Avoid wet areas by rolling the road grade.

Place perforated pipe or an open drainage ditch upslope from the cutbanks (where crossing wet areas) to intercept and divert surface and subsurface water. These practices should be employed only when alternate routes are not available.

Ramp over wet areas using large rocks as a base where cuts are not required.

9. Road Cuts and Fills Subject to Frost Heaving and Sloughing

Minimize heights of cuts and fills by rolling the grade and locating roads on ridges whenever possible.

Plant deep-rooting vegetation on cuts and fills.

Place a straw mat or jute matting on areas that cannot be vegetated within one year following road construction.

Round off upper 2 feet or cuts to reduce sloughing.

Reasons

1. Clearcutting in unstable areas as described above will increase massive failure, especially where roads traverse the clearcut unit.

2. Tractor logging removes the duff layer and results in soil compaction, causing a reduction in infiltration and initiation of overland flow on skid trails and a subsequent reduction in site productivity. Overland flow dislodges and transports soil particles causing water quality degradation.

3. Harvesting bug-killed timber may result in an increase in mass failure incidents. Dead and dying timber is often on unstable positions

created by a seasonal water table that weakened the timber and encouraged insect infestation.

4. Tractor logging in boggy areas may alter or intercept subsurface water flow, causing a rise in the water table and a subsequent reduction in site productivity. High water tables restrict rooting and weaken native vegetation.

5. Bare soil areas resulting from logging are subject to frost heaving and burrowing animal activities. Frost heaving and animal activity destroy surface soil structure and allow soil particles to be dislodged and transported by surface runoff.

6. Roads constructed on oversteepened slopes, hummocky (uneven) topography, and across seeps and old landslides will substantially increase the occurrence of massive failures.

7. Sidecast material from road construction, when saturated, causes road-fill failures.

8. Roads constructed through wet areas often experience prism failures due to a poor bearing surface.

9. Road cuts and fills are subject to sloughing and frost heaving, resulting in soil displacement and subsequent sedimentation during runoff.

P. (861) Rogue Association (W-21 on MFP Step 1 Overlay)

Recommended Practices

1. Clearcutting on or Above Slide Prone Areas

Partial cut using a full suspension yarding system. Actively moving areas should not be harvested.

2. Timber Harvest Site Preparation and Removal of Brush or Hardwoods

Partial cut using full or partial suspension systems on slopes exceeding 70 percent. Most critical conditions exist on south and west exposures where the annual rain fall is less than 35 inches.

Minimize downhill yarding.

Limb all trees before yarding.

3. Tractor Logging on Slopes Over 20 Percent

Tractor logging should be limited to slopes less than 20 percent. Blades should be removed from tractors during logging operations.

Skid roads should be waterbarred and revegetated immediately following logging.

4. Evaluate Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestation. Disturbances caused by tractor logging and road construction may increase infestations which weakens or ultimately kills tree roots, thereby promoting massive failures through loss of mechanical support. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems).

5. Broadcast Burning on Harvested Areas

Herbicides or other means should be used as alternatives to burning or scarification. Do not spray adjacent to live streams.

6. Road Construction on Slopes Exceeding 70 percent

Avoid locating roads on slopes exceeding 70 percent and on areas exhibiting instability. Roll the road grade, taking advantage of natural benches, ridges, and other stable positions.

7. Fills Crossing Drainages

Fills must be designed for overtopping and for stability when saturated. Rock fills are simple and effective.

Consider bridging across debris channels.

8. Granitic Soils Subject to Piping

All fills should be compacted to a degree consistent with design standards and material properties.

9. Large Cuts and Fills Which Produce Considerable Sidecast

Cutslopes should generally be as steep as possible consistent with subsurface strength conditions. Multiple cutslopes should be constructed when weak overburden requires it and it is practical (i.e., natural ground slope makes it feasible). Buttressing should be considered for cutslopes with stability problems.

Fills in excess of 15 feet in downstream exposure should be rock faced instead of vegetated to insure surface stability.

10. Off-Road Vehicle (ORV) Use

ORV's (4-wheel drives and motorbikes) should be limited to surface roads. Discourage travel on skid roads, unsurfaced haul roads, and unroaded areas.

11. Granite Pits

Shape, mulch, seed, and fertilize granite material sites prior to abandonment. Refertilize at 3 to 5 year intervals.

Droughty conditions may require watering to maintain vegetation.

Construct and maintain sediment traps on all streams within the watershed influenced by granite pits.

Reasons

1. Clearcutting on or above debris slide prone areas will substantially increase the probability of massive failure.

2. Clearcutting or removing brush or hardwood on very steeply sloping ground exposes the soil to raindrop splash erosion and initates soil raveling. The soil fines are removed, and the available water capacity is reduced. Once these processes begin, it is difficult to reestablish protective vegetative cover. Uphill yarding results in less surface disturbance than downhill yarding. Removal of limbs will reduce yarding disturbance.

3. Tractor logging on slopes over 20 percent results in surface soil displacement and destruction of protective vegetation. Bare, compacted, and disturbed soils are subject to erosion and subsequent water quality degradation.

4. Harvesting bug-killed timber may increase the mass failure hazard. Dead and dying timber is often on unstable positions created by a water table that weakened the timber and encouraged insect infestation.

5. Broadcast burning on future harvest areas will remove the duff, thereby promoting excessive erosion and reducing site productivity.

6. Road construction on slopes exceeding 70 percent which requires deep fills and/or high cuts, and on those areas showing evidence of instability, will result in substantial increases of massive failure.

7. All fills crossing drainages within this soil association must be viewed as acting as debris dams during their life. Slides occurring in drainageways will plug culverts resulting in road failures.

8. Granitic soils are subject to piping in uncompacted fills.

9. Large cuts and fills produce considerable sidecast, which buries downslope vegetation and creates a droughty condition, resulting in reduced site quality.

10. ORV use increases overland flow by removing the protective duff layer and compacting of the soil, therby increasing erosion. Granite soils lack sufficient cohesion due to small amounts of clay and silt so individual particles are easily detached and transported by water.

11. Granite bedrock, when exposed to weathering by water and temperature changes, rapidly deteriorates and is subject to detachment and transport, which can result in sediment reaching streams.

Q. 882-880 Association (W-22 on MFP Step 1 Overlay)

Recommended Practices

1. Tractor Logging

Tractor log during winter when snow depth exceeds 1 foot.

Use low pressure ground skidder or horses when moisture content is less than 25 percent.

Lay out skid trails prior to timber harvest.

Confine ground lead systems to slopes less than 35 percent.

Skid trails and landings should be ripped and waterbarred following final harvest of driest time of year (July 15 through September 15). Rip to a depth of 12 to 15 inches with spacing equal to depth.

2. Bare Soil Areas Subject to Frost Heaving

Establish deep-rooting native vegetation on bare soil areas.

3. Road Cuts and Fills Subject to Frost Heaving

Minimize heights of cuts and fills by rolling the grade and locating roads on ridges whenever possible.

Plant deep-rooting vegetation on cuts and fills.

Place a straw mat or jute matting on areas that cannot be vegetated within one year following construction.

Reasons

1. Tractor logging removes the duff layer and results in soil compaction, causing a reduction in infiltration and initistion of overlsnd flow on skid trails and subsequent reduction in site productivity. Overland flow dislodges and transports colloidal-sized soil particles, causing water quality degradation.

2. Bare soil areas resulting from logging sre subject to frost heaving. Frost heaving destroys surfsce soil structure and allows soil particles to be dislodged and transported by surface runoff.

3. Road cuts and fills are subject to frost heaving snd subsequent surface erosion by raveling and runoff.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

No. TS

CONTRACT FOR THE SALE OF TIMBER

LUMP SUM SALE

THIS CONTRACT is made and entered into the day of , 19 , under the authority of the Act of August 28, 1937, (50 Stat. 874), as amended, (43 U.S.C. Sec. 1181a–f), relating to the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands, or under the Act of July 31, 1947, (61 Stat. 681), as amended, (30 U.S.C. Secs. 601–604), relating to other lands under the jurisdiction of the Bureau of Land Management, and the regulations as set forth in 43 CFR Group 5400, between the UNITED STATES OF AMERICA, hereinafter called the Government, acting through the Bureau of Land Management, and

of ,

hereinafter called the Purchaser.

WITNESSETH, That the parties hereto do mutually agree as follows:

Sec. 1. *Timber Sold.* The Government hereby sells to the Purchaser and the Purchaser hereby buys from the Government, under the terms and conditions of this contract, all timber, except that reserved to the Government under Sec. 40 of this contract, within the area designated by the Government, comprising the contract area * and situated in the County of ,

State of , and described as follows: .

TOWNSHIP	RANGE	SECTION	SUBDIVISION(s)

Sec. 2. *Total Purchase Price* – Purchaser agrees to pay Government, as the total purchase price for the timber sold hereunder, the sum of

dollars

($); *Provided, however,* that such total purchase price may be adjusted in accordance with Secs. 6, 7, 8, 9, 19, 20, or 41 of this contract.

Sec. 3. *Payment*

(a) Payments under this contract shall be made as set forth in this section.

(b) Unless total purchase price is paid on or before the date this contract is signed by the Authorized Officer, payments shall be made in installments of not less than

dollars

($) as follows: (1) Except as provided in subsection (c) of this section, the first installment shall be paid on or before the date this contract is signed by the Authorized Officer; (2) Except as provided in subsection (c), (d), and (e) of this section, the second installment shall be paid prior to cutting or removal of any timber sold under this contract. Each subsequent installment shall become due and payable without notice whenever the value of timber cut or removed equals the sum of the second and subsequent installments paid by Purchaser. No timber may be cut or removed until such payment has been made. Purchaser shall continue to make such installment payments until the total purchase price has been paid.

(c) Payment of the first installment, required in subsection (b) of this section, may be delayed if Purchaser increases the performance bond as permitted by Sec. 38(b); *Provided, however,* that cash payment for said installment must be made (1) before cutting or removal of the last portion of timber sold having a value equal to the amount of the first installment, or (2) at any time when Government exercises its authority to cancel the rights of Purchaser in accordance with Sec. 10(a), whichever occurs first.

(d) If Purchaser increases its performance bond, as permitted by Sec. 38(c), cutting of timber of a value not in excess of the increase in value of such bond may be permitted prior to payment of the second or subsequent installments; *Provided, however,* that no timber may be skidded or yarded to a loading point or removed from the contract area prior to payment of any installment which, but for the provisions of this subsection, would otherwise be due under the provisions of Sec. 3(b).

(e) If Purchaser provides a payment bond, as permitted by Sec. 38(e), cutting and/or removal of timber of a value not in excess of the penal sum of such bond may be permitted prior to the payment of the second or subsequent installments. Unless a shorter period is agreed to by Purchaser and Government, Government shall bill Purchaser monthly for timber skidded or yarded to a loading point or removed from the contract area. Such billing shall include any amount due for related road maintenance fees. Purchaser shall make payment within fifteen (15) days of the billing date shown on the billing form.

(f) For the purpose of determining (1) when payments are due or (2) the value of timber subject to any special bonding provision, Government shall calculate the value of timber in accordance with the provisions of *Exhibit B,* which is attached hereto and made a part hereof.

(g) Purchaser shall pay the total purchase price not later than the expiration of the time for cutting and removal as set forth in Sec. 4. Purchaser shall make all payments at the office of Authorized Officer in cash, or by money order, bank draft, or check made payable to the Bureau of Land Management.

(h) For any payments or other charge not paid when due, interest shall accrue on the unpaid amount at the rate of six (6) percent per annum, beginning fifteen (15) calendar days after the end of the payment period.

Sec. 4. *Time for Cutting and Removal* – Except as otherwise provided in this contract, Purchaser may begin cutting and removing timber sold under this contract on the date this contract is signed by the Authorized Officer. Purchaser's right to cut and remove such timber shall expire

( ) months

after such date; *Provided, however,* extensions of time may be granted as provided in Sec. 9.

Sec. 5. *Definitions*

(a) *Authorized Officer* – any employee of the Bureau of Land Management to whom has been delegated the authority to take action in connection with this contract.

(b) *Timber* – standing trees, downed trees, or logs, which are capable of being measured in board feet.

(c) *Loading point* – any landing or other area in which logs are capable of being loaded for transportation out of the contract area; *Provided, however,* that right-of-way timber which has been cut shall not be considered to be at a loading point until such time as logs from any source are actually transported over that portion of the right-of-way.

Sec. 6. *Inspection of Timber and Disclaimer of Warranty*

(a) Purchaser warrants that this contract is accepted and executed on the basis of its examination and inspection of the timber sold under this contract and its opinion of the value thereof.

(b) Government expressly disclaims any warranty of fitness of the timber for any purpose; all timber sold hereunder is accepted *As Is* without any warranty of merchantability by Government. Any warranty as to the quantity or quality of the timber sold hereunder is expressly disclaimed by Government. Refund to or recovery by Purchaser for failure of title to any timber sold hereunder shall not exceed the value of such timber computed at prices per unit for species involved as set forth in *Exhibit B.*

Sec. 7. *Passage of Title and Risk of Loss* – Title to timber sold under this contract shall remain in Government and shall not pass to Purchaser until such timber has been paid for and removed from the contract area. Unless cut timber is sold under this contract, risk of loss shall be borne by Purchaser after the timber is cut; *Provided, however,* that if loss results from a fire which was not caused by Purchaser, his contractors, subcontractors, or the employees of any of them, the risk of loss shall be borne by the party holding title. If cut timber is sold under this contract, risk of loss shall be borne by the party holding title. Risk of loss to Government shall

* *General location of contract area is shown on map marked Exhibit A which is attached hereto and made a part hereof*

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of any of them, results in additional work by Purchaser involving an additional estimated cost of more than (1) $1,000 for sales under one million board feet; (2) $1.00 per thousand board feet for sale of one to three million board feet; or (3) $3,000 for sales over three million board feet, Government shall become responsible for any estimated cost which exceeds the above amounts. Government may elect to meet its share by reducing the purchase price or by payment of such cost to Purchaser or by performing its share of the necessary work. The estimated cost of additional work shall be calculated by the Authorized Officer using Bureau of Land Management prescribed appraisal procedures. Such cost shall include the cumulative estimated costs of repairing damage from slides, washouts, landslips, fire, etc. caused by said event. If necessary, plans and specifications shall be revised to meet the new conditions. Purchaser must obtain advance approval from the Authorized Officer for such additional work in order for Purchaser to be eligible for cost adjustment under this section.

Sec. 20. *Design Change* — If Purchaser and the Authorized Officer agree on a design change of a substantial nature in any road, road structure, or bridge required to be constructed or improved under the terms of this contract, the total purchase price shall be revised to reflect the estimated increase or decrease in cost resulting from such design change. A design change of substantial nature is one that would result in a cost adjustment of $1,000 or more.

Sec. 21. *Rights and Obligations After Time for Removal of Personal Property or Cancellation of the Rights of the Purchaser* — If any of Purchaser's obligations remain unperformed after expiration of the time for removal of personal property, as set forth in Sec. 39, or if the rights of Purchaser under this contract have been cancelled by Government, all provisions of this contract for the benefit and protection of Government or third parties shall remain in effect until this contract is terminated in its entirety by Government.

Sec. 22. *Protection of Survey Monuments, Witness Corners, Reference Monuments, and Bearing Trees* — Purchaser shall protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the contract area. If any monuments, corners, or accessories are destroyed, obliterated, or damaged by such operations, Purchaser shall hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories, at the same location, using surveying procedures in accordance with the *Manual of Instructions for the Survey of the Public Lands of the United States*, and shall record such survey in appropriate county records. The Authorized Officer may prescribe in writing additional requirements for protection of monuments, corners, and bearing trees.

Sec. 23. *Purchaser's Representative* — At all times when construction or logging operations are in progress, Purchaser shall have a representative readily available in the area of such operations who shall be authorized to receive, in behalf of Purchaser, any notices or instructions from the Authorized Officer in regard to performance under this contract. Purchaser shall take such action as is required by the terms of this contract.

Sec. 24. *Simultaneous Use of Contract Area by Others* — If the Authorized Officer determines that other use of the contract area will not seriously interfere with the operations of Purchaser, he may issue permits, leases, or contracts for the simultaneous use of the contract area by others.

Sec. 25. *Watershed Protection: Water Quality, Erosion Control and Soil Damage*

(a) Purchaser shall comply with all applicable State and Federal laws and regulations pertaining to water quality in connection with any operations under this contract.

(b) Purchaser shall take every reasonable precaution not to pollute or obstruct any stream, lake, or reservoir on or near the contract area in connection with any operations under this contract. If Purchaser's operations cause pollution or obstruction of any stream, lake, or reservoir on or near the contract area, Purchaser shall correct the condition to the satisfaction of the Authorized Officer.

(c) Purchaser shall undertake every reasonable measure to minimize erosion and soil damage in connection with any operations under this contract, including but not limited to construction of water bars on yarding and spur roads as designated by the Authorized Officer. Purchaser shall immediately discontinue any construction or timber harvesting operations under this contract, upon receipt of written notice from the Authorized Officer that due to weather or soil moisture conditions, such operations will cause excessive damage to the soil. The Authorized Officer shall notify Purchaser, in writing, when such operations may be resumed.

Sec. 26. *Refuse Control and Disposition of Waste Materials*

(a) Purchaser shall, to the satisfaction of the Authorized Officer, remove, or otherwise dispose of all garbage, temporary buildings, trash, litter, discarded equipment or parts, waste materials or other refuse resulting from Purchaser's operations. Areas for disposal of waste material shall be subject to approval of the Authorized Officer.

(b) Waste materials, such as garbage, trash, oil, grease, chemicals and similar substances shall be disposed of in a manner that will prevent their entry by drainage, high water, or other means into any river, watercourse, lake, or reservoir in or near Purchaser's operations. Water used to wash down equipment used for petroleum products, industrial chemicals, cement or other toxic materials shall be disposed of in a manner that will prevent their entry into any watercourse or waterway.

Sec. 27. *Storage and Handling of Hazardous Materials* — All petroleum products, industrial chemicals and similar toxic or volatile materials stored by Purchaser on or near the contract area, in connection with operations under this contract, shall be stored in durable containers and shall be stored in areas, as determined by the Authorized Officer, which are either located so that any accidental spillage will not drain into any watercourses, lakes, or reservoirs or, when such areas are not available, shall be stored in an area surrounded by impermeable containment dikes of sufficient capacity to contain the aggregate capacity of all tanks.

In addition, Purchaser shall comply with all applicable State and Federal laws and regulations concerning the storage, handling, use and disposal of industrial chemicals, pesticides, herbicides, and other hazardous substances.

Sec. 28. *Safety and Health* — Purchaser shall conduct all operations in connection with this contract in compliance with the applicable provisions of Federal, State, and local safety, health and sanitation laws, codes, and regulations and shall make it possible for the Authorized Officer to inspect such operations.

Sec. 29. *Equal Opportunity* — During the performance of this contract, Purchaser agrees as follows:

(a) Purchaser will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. Purchaser will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Purchaser agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this section.

(b) Purchaser will, in all solicitations or advertisements for employees placed by or on behalf of Purchaser, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

(c) Purchaser will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of Purchaser's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) Purchaser will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) Purchaser will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of Purchaser's noncompliance with this section, contract may be cancelled, terminated or suspended in whole or in part and Purchaser may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, as amended, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) Purchaser will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, as amended, so that such provisions will be binding upon each subcontractor, or vendor. Purchaser will take such action with respect to any subcontract, or purchase order, as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: *Provided, however*, that in the event the Purchaser becomes involved in, or is threatened with, litigation with a subcontractor, or vendor as a result of such direction by the contracting agency, Purchaser may request the United States to enter into such litigation to protect the interests of the United States.

Sec. 30. *Records and Reports* — Upon request of the Authorized Officer, Purchaser shall furnish the following records and reports: (1) volume or quantity of timber cut and removed from the contract area; (2) road costs including road use fees paid in connection with removing timber from the contract area; and (3) prices received for lumber or other wood products.

Sec. 31. *Unsatisfactory Bond* — Whenever any performance or payment bond furnished under this contract becomes unsatisfactory to the Authorized Officer, he may require a new bond which is satisfactory to him.

Sec. 32. *Assignments*

(a) Purchaser may not assign this contract or any interest therein without written approval of the Authorized Officer. An assignment shall contain all the terms and conditions agreed upon by the parties thereto.

(b) The Authorized Officer will not approve any assignment involving contract performance unless assignee: (1) is authorized to transact business in the State indicated in Sec. 1; (2) submits such information as is necessary to assure the Authorized Officer of his ability to fulfill the contract; and (3) furnishes a performance bond as required by Sec. 38 or obtains a commitment from the previous surety to be bound by the assignment when approved. Upon approval of an assignment by the Authorized Officer, the assignee shall be entitled to all the rights and subject to all the obligations of this contract and the assignor shall be released from any further liability under this contract.

not exceed the value of such timber computed at the prices per unit for the species involved as set forth in *Exhibit B*. Nothing herein shall be construed to relieve either party from liability for any breach of contract or any wrongful or negligent act. As used in this section, the term *cut timber* refers only to timber which has been felled, bucked, or otherwise severed by direct human activity prior to the date this contract was entered into.

Sec. 8. Sales of Additional Timber – If the Authorized Officer and Purchaser agree that additional timber should be removed and the Authorized Officer determines that the sale will not be detrimental to the interests of Government and is within the provisions of 43 CFR 5402.0–6, the Authorized Officer shall grant written permission to Purchaser to cut and remove such timber. If permission is granted, Purchaser shall pay for such timber at a price determined by the Authorized Officer in accordance with the Bureau of Land Management prescribed procedures. The value and volume of such timber shall be added to *Exhibit B* and the value thereof shall be added to total purchase price in Sec. 2. Payment for such timber shall be made in accordance with Sec. 3(b) or 3(e), except that, if all contract payments required by Sec. 3(b) or 3(e) have been made, payment for such timber shall be made in advance as a condition of granting such permission.

Sec. 9. Extension of Time and Reappraisal – If Purchaser shows that delay in cutting and removal was due to causes beyond his control and without his fault or negligence, the Authorized Officer may grant an extension of time, not to exceed one year, upon written request of Purchaser. Such written request shall be filed with the Authorized Officer prior to the expiration of the time for cutting and removal expressed in Sec. 4. If an extension of time is granted, as provided in this section, timber remaining on contract area shall be reappraised by the Authorized Officer, using Bureau of Land Management prescribed procedures, and the total purchase price adjusted accordingly; *Provided, however,* no adjustment shall be made by reason of timber being enhanced in value by Purchaser, nor shall the reappraised total purchase price be less than the total purchase price in effect during the original time for cutting and removal or the last extension. The Authorized Officer may require that the reappraised total purchase price shall be paid in advance as a condition of granting an extension. Market fluctuations shall not be cause for consideration of contract extensions.

Sec. 10. Violations, Suspension, and Cancellation

(a) If Purchaser violates any provision of this contract, the Authorized Officer may, by written notice, suspend any further operations of Purchaser under this contract, except such operations as may be necessary to remedy the violation. If Purchaser fails to remedy the violation within thirty (30) days after receipt of a suspension notice, the Authorized Officer may, by written notice, cancel the rights of the Purchaser under this contract and take appropriate action to recover all damages suffered by Government by reason of such violation, including application toward payment of such damages of any advance payments and any performance bonds or, where applicable, any payment bonds; *Provided, however,* that if the violation involves nonpayment of amounts due for timber cut and/or removed under a payment bond of a corporate surety, the Authorized Officer must, in addition to the above requirements, allow sixty (60) days after making demand upon surety for any payment due before cancelling the rights of Purchaser.

(b) If Purchaser cuts or removes any timber sold under this contract during any period of suspension, such cutting or removal shall be considered a wilful trespass and render Purchaser liable for damages under applicable law. Any payment made for purchase price of timber cut or removed in trespass shall be deducted to the extent of single damages or the value of timber under this contract, whichever is lesser, from amount due because of trespass.

(c) If Purchaser's operations are suspended because of Purchaser's failure to make an installment payment when due, the Authorized Officer may require Purchaser to pay the entire remaining balance of the purchase price as a condition of terminating the suspension.

(d) If Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government timber reserved under this contract, they shall fully cooperate, upon request of the Authorized Officer, in the investigation of such acts. If in the opinion of the Authorized Officer, full cooperation is not received or will not be forthcoming, he may suspend that portion of Purchaser's operations necessary to preserve evidence pending investigation or permit safe investigation of such acts.

Sec. 11. Credit Against Purchase Price – If the time specified for cutting and removal of timber has expired or the rights of Purchaser have been cancelled, Purchaser shall be entitled to a credit against any amount which is due and owing Government for timber remaining on the contract area. The Authorized Officer shall determine the credit value of the remaining timber as soon as possible after the date of expiration or cancellation. Credit value of the remaining timber shall be total market value, as established by the Authorized Officer by reappraisal or resale, or total value based upon contract unit prices, whichever is less. There shall be deducted from credit value such amounts as the Authorized Officer determines adequate to cover costs to Government resulting from Purchaser's failure to perform, including but not limited to costs of appraising and administering any resale of timber.

Sec. 12. Responsibility for Damage Suffered, Cost, or Expense Incurred by Government – Purchaser shall be liable for any damage suffered, cost, or expense incurred by Government arising out of any operations under this contract whenever such damage, cost, or expense results from any breach of contract or wrongful or negligent act of Purchaser, his contractors, subcontractors, or the employees of any of them. Purchaser shall pay Government for such damage, cost, or expense after written demand therefor by the Authorized Officer.

Sec. 13. Timber Trespass – If in connection with operations hereunder Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government timber, other than timber sold under this contract, Purchaser shall be liable for damages under applicable law. Purchaser shall pay Government for such damages after written demand therefor by the Authorized Officer.

Sec. 14. Protection of Utilities and Improvements – Existing telephone, telegraph and transmission lines, fences, ditches, roads, trails, and other improvements shall be protected as far as practicable in all phases of Purchaser's construction or logging operations. All roads and trails, designated by the Authorized Officer as needed for fire protection or other purposes, shall be kept free of logs, slash, and debris. Damage to utilities and improvements shall be promptly paid for or repaired to a condition which, in the opinion of the Authorized Officer, is at least as good as the condition just prior to such damage.

Sec. 15. Fire Prevention and Slash Disposal – Purchaser shall take such measures for prevention and suppression of fire on the contract area and other adjacent Government lands or other Government lands used or traversed by Purchaser in connection with operations as are required by applicable laws and regulations. *However,* when in the opinion of the Authorized Officer, weather and other conditions affecting fire incidence and control make special precautions necessary to protect the contract area and said Government lands, Purchaser shall take such additional or other fire prevention and control measures as may be required by the Authorized Officer. Disposal of slash shall be done in accordance with a plan approved by the Authorized Officer.

Sec. 16. Construction, Use and Maintenance of Roads and Facilities

(a) Subject to the written approval of and regulation by the Authorized Officer, Purchaser may: (1) construct and use any new roads and facilities not otherwise provided for in this contract, and (2) use any existing roads and facilities not otherwise provided for in this contract.

(b) Except as provided in Sec. 12, Purchaser shall perform or pay for repair and maintenance of any road or facility used under the terms of this contract in accordance with the requirements of Sec. 41; *Provided, however,* that Purchaser shall not be responsible for maintenance or repair of wear or damage caused by third parties, or maintenance or repair which exceeds the standards of required maintenance shown in Sec. 41; and *Provided, further,* that Purchaser's responsibility under this provision shall not commence prior to the date on which he first begins operations and shall cease upon completion and written acceptance of all contract requirements other than slash disposal, except for maintenance and repair of damages resulting from Purchaser's slash disposal activities.

Sec. 17. Limitations of Road Use

(a) Purchaser's right under this contract to use existing Government roads described herein, or roads to be constructed, is limited to removal of timber sold under this contract; *Provided, however,* that this provision shall not limit any right to use Government roads or rights-of-way which have been granted to Purchaser pursuant to 43 CFR Group 2800.

(b) For the purpose of protecting roads described herein, Purchaser shall immediately discontinue use of said roads upon receipt of written notice that the Authorized Officer has determined that continued use will cause excessive damage to said roads.

Sec. 18. Acceptance of Road Construction

(a) Whenever Purchaser shall deliver to the Authorized Officer a written statement that the road construction is complete, pursuant to the contract terms, the Authorized Officer shall promptly inspect such road. If the contract road construction requirements have been completed to the satisfaction of the Authorized Officer, Purchaser will be given written notice of acceptance, and, except as provided in Sec. 12, be released from further liability or duty for construction or reconstruction of such road.

(b) Notwithstanding acceptance of any road under this section, Purchaser shall remain liable for maintenance and repair of any such road in accordance with the provisions of Sec. 16.

Sec. 19. Cost Adjustment for Physical Changes – If, prior to acceptance of a road under Sec. 18, a major physical change, caused by a single event, and not due to negligence of Purchaser, his contractors, subcontractors, or the employees

Sec. 33. Contingent Fees — Purchaser warrants that no person or agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee excepting bona fide employees or bona fide established commercial agencies maintained by Purchaser for the purpose of securing business. For breach or violation of this warranty, Government shall have the right to cancel this contract without liability or, in its discretion, to require Purchaser to pay, in addition to the contract price or consideration, the full amount of such commission, percentage, brokerage, or contingent fee.

Sec. 34. Successors in Interest — Every obligation hereunder shall extend to and be binding upon the successors in interest of the parties hereto and every benefit hereunder shall inure to such successors.

Sec. 35. Exercise of Rights or Duties of the Authorized Officer — The rights or duties of the Authorized Officer may be exercised by the Authorized Officer or his designated representative.

Sec. 36. Officials not to Benefit — No Member of, or Delegate to Congress, or Resident Commissioner, after his election or appointment, or either before or after he has qualified and during his continuance in office, and no officer, agent, or employee of the Department of the Interior, except as provided in 43 CFR 7.4, shall be admitted to any share or part in this contract or derive any benefit that may arise therefrom; and the provisions of Section 3741 of the Revised Statutes of the United States, as amended (41 U.S.C. Sec. 22), and Sections 431, 432, and 433, Title 18, U.S.C., relating to contracts, enter into and form a part of this contract so far as the same may be applicable.

Sec. 37. Appeal — An appeal may be taken from any decision of any officer of the Bureau of Land Management to the Board of Land Appeals pursuant to the Rules of Practice (43 CFR Part 4 Subpart E).

Sec. 38. Bond

(a) A performance bond shall be filed by Purchaser on or before the date this contract is signed by the Authorized Officer in the amount of

dollars ($).

(b) If Purchaser elects to increase the amount of the performance bond required above by an amount equal to the first installment, in order to secure the delayed payment of said installment, as provided in Sec. 3(c), increased bond shall be on a form approved by the Director of the Bureau of Land Management which upon completion must be approved, in writing, by the Authorized Officer. If a corporate surety bond is used, the bond shall provide that the Surety will pay to Government the amount of the increase within sixty (60) days after demand by Government whenever the Principal shall fail to make payment as required in Sec. 3(c).

(c) If Purchaser elects to cut timber before payment of the second or subsequent installments, Purchaser shall increase the amount of the required performance bond by an amount equal to one or more installments, as set forth in Sec. 3(b). The adjusted bond must be approved, in writing, by the Authorized Officer prior to cutting any timber under the adjusted bond. The increased amount of bond shall be used to assure payment for such timber. Timber cut pursuant to this subsection may be paid for in installments. Upon payments, the increased amount of bond may be applied to other timber sold under this contract to permit its cutting in advance of payment.

(d) As contract provisions are completed to the satisfaction of the Authorized Officer, he may, in his discretion, reduce amount of performance bond required; *Provided, however,* the performance bond may not be reduced below the amount of

dollars ($)

until total purchase price has been paid. The performance bond shall be forfeited to the amount of damages, determined by the Authorized Officer if all contract provisions are not faithfully and fully performed by Purchaser. If the amount of damages exceeds the amount of the bond, Purchaser hereby agrees to pay the excess. Upon satisfactory performance of all provisions of this contract, the bond shall be cancelled or, if cash or negotiable securities are furnished in lieu of a performance bond, such cash or negotiable securities shall be returned to Purchaser. In event of litigation, any determination by the Authorized Officer as to the amount of damages will be subject to review by a court of competent jurisdiction.

(e) If Purchaser elects to: (1) cut and remove timber or (2) remove timber already cut which has been secured by an increased performance bond as provided in Sec. 38(c), before payment of the second or subsequent installments, Purchaser shall obtain a payment bond in an amount equal to one or more installments as set forth in Sec. 3(b). The payment bond must be approved, in writing, by the Authorized Officer prior to cutting or removing any timber under the bond. The amount of the bond shall be used to assure payment for such timber, *Provided, however,* that such bond shall be considered as payment under Sec. 7, for the purpose of passing title and risk of loss to timber sold. Timber cut pursuant to this subsection shall be paid for as provided in Sec. 3(e). Upon payment, the amount of the bond may be applied to other timber to permit its cutting and/or removal in advance of payment. If a bond of a corporate surety is used, it shall provide that, if Purchaser fails to make payment as required by Sec. 3(e), the surety will make such payment including interest as specified in Sec. 3(h), to Government within sixty (60) days after demand by Government.

Sec. 39. Time for Removal of Personal Property — Purchaser shall have the right within ( ) months after expiration of time for cutting and removal to remove his equipment, improvements, or other personal property from Government lands or rights-of-way; *Provided, however,* that any improvements such as road surfacing, culverts and bridges which have become a permanent part of a Government road, shall not be removed. The Authorized Officer may, in his discretion, grant an extension of time, not to exceed three (3) months for removal of personal property. Any equipment, improvements, or other personal property remaining on Government lands and rights-of-way at the end of the period for removal, or any extension, shall become the property of Government.

Sec. 40. Timber Reserved from Cutting — The following timber on the contract area is hereby reserved from cutting and removal under the terms of this contract and is retained as the property of Government.

Sec. 41. Special Provisions — Purchaser shall comply with the special provisions which are attached hereto and made a part hereof unless otherwise authorized, in writing, by the Authorized Officer.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day first above written.

If Individual or Partnership, sign here:	If Corporation, sign here:
(Name of Firm)	(Name of Corporation)
(Name)	(Name)
(Address)	(Title)
(Name)	UNITED STATES OF AMERICA
(Address)	By (Name)
(Name)	(Title)
(Address)	(Date)

(If Purchaser is a corporation, the following certificate must be executed by the Secretary or Assistant Secretary of the Corporation)

I, , certify that I am the Secretary of the corporation named as Purchaser herein; that , who signed the contract was then of said corporation, that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

[CORPORATE SEAL]

Appendix F

Soils

This appendix describes in greater detail the extent and properties of various soils found in the JKSYUs.

The individual soil mapping units are grouped as follows in the general soils map:

General Soils Unit	Component Mapping Units
Alluvial	1
36-R	36-R/XY,XYn,Y; R; 705-36/X,Xn,XY,XYn,Y
371-372-370	371-372-370/XY,XYn; 372-371/Y,Yn; 370-382-371/XW,XWn,XY,XYn; 372-R/Y
381-380	380/W; 380-382/WX,WXn; 381-380/X
706-36-705	706/W; 706-36/WV,W,WX,WXn; 36-705/XY,XYn; 706-710/VW,WV; 704/W; 704-36/XY
716-715	715-716/X,Xn; 716-715/V,W; 715-R/XY
718-701-719	718-701/XY,XYn,Yn; 701-R/Y; 718-719/WX; 719/VW,W,Wn,WX,WXn; 824-825/XY,XYn
718-781-719	718-781/Xn,XY,XYn; 719-781/WX,WXn; 718-719/WX; 718-719/WX,WXn,XY,XYn; 719/VW,W,Wn,WX,WXn
721-722	721/X,Xn,XY,XYn,Y; 722/V,VW,W,Wn
731-741	731-732/XY,XYn;741/W,WX; 741-731/X,Xn; 732-R/Y
745-706	745-706/WX,X,Xn; 706-745/WX,X,Xn,WV; 745/V,WV,Wn; 745-36/X; 745-705/WV,WX,X
750-740	740-750/X,Xn; 750/V,VW,W,Wn,WX; 750-740/WX,WXn
770-R	770-R/XY
809-810	809-810/V,VW,W,Wn,X,Xn; 806-R/VW,X; 810-809/WX, WV,WXn,V; 809-806/VW
824-825	824-825/XY,XYn
840-850-842	840/X,Xn; 840-842/X,Xn,XY,XYn; 850/V,VW
861	861/XYn,XY,Y,Yn
882-880	880/V; 882/WX,WXn,X,XY; 882-880/VW,W; 790/WX

These general soils units have the following acreages in the JKSYUs:

General Soils Unit	Acreage (acres and percent of total)		
	BLM	Other	Total
Alluvial	2,320 (0.5)	17,390 (4.6)	19,710 (2.3)
36-R	50,660 (10.5)	22,930 (6.1)	73,590 (8.6)
371-372-370	27,610 (5.7)	22,160 (5.9)	39,770 (4.6)
381-380	1,970 (0.4)	1,990 (0.5)	3,960 (0.5)
706-36-705	43,880 (9.1)	45,190 (12.0)	89,070 (10.4)
716-715	4,590 (0.9)	7,350 (2.0)	11,940 (1.4)
718-701-719	64,585 (13.4)	32,090 (8.5)	96,675 (11.2)
718-781-719	67,915 (14.0)	46,590 (12.4)	114,505 (13.3)
721-722	20,030 (4.1)	13,440 (3.6)	33,470 (3.9)
731-741	15,100 (3.1)	13,060 (3.5)	28,160 (3.3)
745-706	34,880 (7.2)	37,650 (10.0)	72,530 (8.4)
750-740	29,060 (6.0)	24,500 (6.5)	53,560 (6.2)
770-R	1,690 (0.3)	1,340 (0.4)	3,030 (0.4)
809-810	60,380 (12.5)	33,020 (8.8)	93,400 (10.9)
840-850-842	16,680 (3.4)	13,180 (3.5)	29,860 (3.5)
861	3,650 (0.8)	870 (0.2)	4,520 (0.5)
882-880	38,240 (7.9)	37,790 (10.0)	76,030 (8.8)
Reservoirs	490 (0.1)	6,200 (1.6)	6,690 (0.8)
Total	483,730	376,740	860,470

The general soils map units can be grouped as to parent materials and location. Soils in each group may have similar properties and behave similarly. As discussed in Section 2.4.3, soils from serpentinitic and acid, granitoid rocks cause problems in the timber management program.

Alluvial soils (in valleys)	1
Siskiyou Mountains	
Soils from Serpentinitic Rocks	770-R*
Soils from Acid, Granitoid Rocks	721-722* 861*
Soils from Sedimentary and Metamorphic Rocks	371-372-380 381-380 716-715 718-701-719 718-781-719 824-825
Cascade Mountains	
Soils from Igneous Rocks	36-R 706-36-705 731-741 745-701 750-740 809-810 840-850-842 882-880

* These soils have been removed from the high intensity lands by the TPCC process. They make up about 5.2 percent of the BLM-administered lands in the JKSYUs, and 4.8 percent of the entire JKSYUs.

Table F-1

Soil Mapping Units and Acreages for the Jackson and Klamath SYUs

Map Symbols	Acres BLM	Acres Other	Acres Total
1	2,320	17,390	19,710
R	10,220	2,640	12,860
Reservoir	490	6,200	6,690
36-R/XY	10,340	2,390	12,730
36-R/XYn	1,680	90	1,770
36-R/Y	2,530	1,240	3,770
36-705/XY	4,320	3,820	8,140
36-705/XYn	430	120	550
370-382-371/XW	2,080	2,120	4,200
370-382-371/XWn	480	330	810
370-382-371/XY	2,990	2,210	5,200
370-382-371/XYn	4,000	3,140	7,140
371-372-370/XY	7,960	8,360	16,320
371-372-370/XYn	6,610	5,000	11,610
372-371/Y	350	310	660
372-371/Yn	2,780	670	3,450
372-R/Y	360	20	380
380/W	120	320	440
380-382/WX	1,060	1,120	2,180
380-382/WXn	90	100	190
381-380/X	700	450	1,150
701-R/Y	4,660	280	4,940
704/W	470	1,020	1,490
704-36/XY	2,780	2,970	5,750
705-36/X	1,430	710	2,140
705-36/Xn	2,730	1,610	4,340
705-36/XY	12,870	8,510	21,380
705-36/XYn	7,530	5,230	12,760
705-36/Y	1,330	510	1,840
706/W	8,900	7,110	16,010
706-36/WV	5,100	5,140	10,240
706-36/W	1,170	1,080	2,250
706-36/WX	9,760	9,250	19,010
706-36/WXn	4,960	5,170	10,130
706-710/VW	3,130	3,500	6,630
706-710/WV	2,860	6,010	8,870
706-745/WV	3,690	6,420	10,110
706-745/WX	3,520	6,510	10,030
706-745/X	4,840	2,760	7,600
706-745/Xn	3,340	2,010	5,350
715-716/X	1,400	670	2,070
715-716/Xn	90	100	190
715-R/XY	320	190	510

Table F-1 (Continued)

Soil Mapping Units and Acreages for
the Jackson and Klamath SYUs

Map Symbols	Acres BLM	Acres Other	Acres Total
716-715/V	610	1,330	1,940
716-715/W	2,170	5,060	7,230
718-701/XY	33,260	11,200	44,460
718-701/XYn	9,030	5,500	14,530
718-701/Yn	7,750	370	8,120
718-719/WX	2,360	230	2,590
718-781/Xn	1,340	1,080	2,420
718-781/XY	17,130	6,680	23,810
718-781/XYn	21,040	13,110	34,150
719/VW	2,680	10,000	12,680
719/W	3,940	11,700	15,640
719/Wn	7,990	4,740	12,730
719/WX	2,070	2,080	4,150
719/WXn	730	730	1,460
719-781/WX	1,600	2,460	4,060
719-781/WXn	2,300	710	3,010
721/X	2,650	1,480	4,130
721/Xn	290	190	480
721/XY	8,890	6,110	15,000
721/XYn	2,780	1,020	3,800
721/Y	70	150	220
722/V	790	680	1,470
722/VW	1,770	1,920	3,690
722/W	2,360	1,540	3,900
722/Wn	430	350	780
731-732/XY	3,210	2,430	5,640
731-732/XYn	6,120	5,240	11,360
732-R/Y	880	430	1,310
740-750/X	2,280	4,080	6,360
740-750/Xn	2,780	3,460	6,240
741/W	360	120	480
741/WX	1,180	840	2,020
741-731/X	1,990	2,510	4,500
741-731/Xn	1,360	1,490	2,850
745/V	100	890	990
745/WV	210	720	930
745/Wn	1,220	2,130	3,350
745-36/X	1,410	450	1,860
745-705/WV	860	1,190	2,050
745-705/WX	3,080	6,120	9,200
745-705/X	3,170	1,870	5,040
745-706/WX	1,820	10	1,830
745-706/X	1,250	2,490	3,740

Table F-1 (Continued)

Soil Mapping Units and Acreages for
the Jackson and Klamath SYUs

Map Symbols	Acres BLM	Other	Total
745-706/Xn	6,370	4,080	10,450
750/V	2,220	1,310	3,530
750/VW	6,670	8,340	15,010
750/W	1,510	4,450	5,960
750/Wn	450	420	870
750/WX	520	2,330	2,850
750-740/WX	4,690	110	4,800
750-740/WXn	7,940	0	7,940
770-R/XY	1,690	1,340	3,030
781-719/WX	4,900	3,160	8,060
781-719/WXn	1,910	1,010	2,920
781-719/XY	6,660	3,010	9,670
781-719/XYn	1,150	630	1,780
790/WX	920	0	920
806-R/VW	1,530	310	1,840
806-R/X	810	920	1,730
809-806/VW	2,200	6,010	8,210
809-810/V	3,230	1,330	4,560
809-810/VW	10,850	1,910	12,760
809-810/W	3,360	0	3,360
809-810/Wn	5,650	3,840	9,490
809-810/X	720	80	800
809-810/Xn	2,220	2,400	4,620
810-809/V	10,710	6,040	16,750
810-809/WV	5,170	2,930	8,100
810-809/WX	9,450	5,550	15,000
810-809/WXn	4,480	1,700	6,180
824-825/XY	600	370	970
824-825/XYn	1,500	280	1,780
840/X	330	350	680
840/Xn	2,300	1,830	4,130
840-842/X	940	620	1,560
840-842/Xn	2,290	560	2,850
840-842/XY	2,210	460	2,670
840-842/XYn	3,730	3,280	7,010
850/V	80	590	670
850/VW	4,800	5,490	10,290
861/XY	760	0	760
861/XYn	430	10	440
861/Y	80	90	170
861/Yn	280	120	400
880/V	10,910	13,620	24,530
882/WX	2,710	3,340	6,050

Table F-1 (Continued)

Soil Mapping Units and Acreages for
the Jackson and Klamath SYUs

Map Symbols	Acres BLM	Other	Total
882/WXn	2,330	1,490	3,820
882/X	2,520	1,970	4,490
882/XY	820	130	950
882-880/VW	14,200	14,760	28,960
882-880/W	3,830	2,480	6,310

Source: DeMoulin et al. 1975

Table F-2

Soils of the Jackson and Klamath SYUs and Their Properties and Interpretations

					Soil Characteristics					Soil Qualities and Interrelations					
Map Sym.	Mean Elev. (ft.)	Precip. Zone (in.)	Classification Subgroup- -Family- -Series	Position on Landform	Parent Material	Texture Surface Soil, Sub-Soil	Dominant Slope Range%	Aspect	Coarse Fragments Kind & %	Profile Depth (in.)	Permeability	Compaction Hazard	Drainage	Avail. H_2O Holding capacity (in.)	Major Limitations
1			miscellaneous land type (Alluvial land)	flood plains of old Stream Terraces	Holocene alluvium	-	0-3	-	-	-	-	-	-	-	-flooding, -high water table
R			miscellaneous land type (Rock land)	rock outcrop	-	-	0-90+	-	-	0-12	-	-	-	-	-shallow
(36)	1500-6000	20-35	Lithic Ultic Haploxerolls- -loamy-skeletal, mixed, mesic- -Witzel	mt'ous slopes	vol-canic	VStSiCL / VStSiCL	35-85+	South	stones 35-70	12-20	MS	slight	well drn'd	3	-shallow -droughty -stony
370	1500-4000	35-70	Dystric Xerochrepts- -loamy-skeletal, mixed, mesic- -unnamed	mt'ous slopes	mixed collu-vium	GL / L	10-85+	N. if below 2500 ft	gravel 35-75	40+	M	mod.	well drn'd	3-6	-steep -droughty
371	1500-4000	35-70	Typic Xerochrepts- -loamy-skeletal over fragmental, mixed mesic- -unnamed	mt'ous slopes	mixed collu-vium	VGL / L	35-85+	N. if below 2500 ft	gravel 35-75	20-40	M	slight	well drn'd	3-6	-droughty -steep
372	1500-4000	35-80	Lithic Xerochrepts- -loamy-skeletal, mixed mesic- -unnamed	mt'ous slopes	mixed collu-vium	GL / VGCL	35-85+	N. if below 2500 ft	gravel 35-70	0-12	M	slight	well drn'd	3	-droughty -steep -shallow
(380)	1500-4000	35-80	Typic Haploxerults- -fine, mixed, mesic- -Pollard	mt'ous slopes	mixed collu-vium	GL / C	35-60+	N. if below 2000 ft	gravel 5-35	40+	MS	severe	well drn'd	6-9	-compaction -steep -sediment
381	1500-4000	35-80	Typic Haploxerults- -clayey-skeletal, mixed, mesic- -unnamed	mt'ous slopes	mixed collu-vium	GCL / VGC	35-85	N. if below 2000 ft	gravel 35-75	20-40	MS	mod.-severe	well drn'd	3-6	-compaction -steep -erosion
382	1500-4000	35-80	Typic Haploxerults- -clayey-skeletal, mixed, mesic- -unnamed	mt'ous slopes	mixed collu-vium	GCL / VGCL	10-65	N. if below 2000 ft	gravel 35-75	40+	MS	mod.-severe	well drn'd	3-6	-compaction -slumping -erosion
701	1200-4000	20-35	Lithic Xerochrepts- -loamy-skeletal, mixed, mesic- -unnamed	mt'ous slopes	meta-morphic collu-vium	VGL / VGL	35-85	South	gravel 35-70	12-20	M-M rapid	slight	some-what excess-ively drn'd	3	-droughty -erosion

(704)	1300-3000	18-30	Typic Chromoxererts- -very fine, montmorillontic, mesic- -Carney	fans & terraces	volc. flows, tuffs & shale	C / C	3-70	South	gravel 0-15	20-40	VS	severe	well drn'd	3	-compaction -erosion -slumping -droughty
705	1200-4000	20-35	Pachic Ultic Argixerolls- -clayey-skeletal, mixed, mesic- -unnamed	mt'ous slopes	volcanic	CbCL / VCbC	10-85+	varies	gravel-stones 35-75	20-40	MS	mod.	well drn'd	3-6	-droughty -slumping -coarse fragments -regeneration
(706)	1200-4000	20-35	Ultic Haploxerolls- -very fine, mixed, mesic- -Medco	mt'ous slopes	tuff	CL / C	5-35	varies	gravel 5-35	20-40	VS	severe	M well drn'd	3-6 3-6	-droughty -high water table -compaction -erosion
(710)	1100-2000	18-25	Chromic Pelloxererts- -very fine, montmorillonitic, mesic- -Coker	alluvial fans	tuffaceous sandstone & alluvium	C / C	0-10	-	gravel 0-5	40+	VS	severe	somewhat poorly drn'd	6-9	-erosion -slumping -wetness -regeneration
(715)	1200-3000	18-30	Typic Xerochrepts- -fine-loamy, mixed, mesic, shallow- -Brader	mt'ous slopes	sandstone	L / CL	5-85	varies	gravel 0-25	12-20	M	slight	well drn'd	3	-droughty -erosion -shallow
(716)	1200-3000	18-30	Typic Xerochrepts- -fine-loamy, mixed, mesic- -Debenger	mt'ous slopes	sandstone	L / CL	5-60	South	gravel 0-25	20-40	M	slight	well drn'd	3-6	-droughty -erosion
(718)	1000-4000	20-35	Typic Xerochrepts- -loamy-skeletal, mixed, mesic- -Beekman	mt'ous slopes	metamorphic colluvium	VGL / VGL	35-85	S. if above 2500 ft	gravel 35-75	20-40	M	slight	well drn'd	3-6	-droughty -erosion -gravelly
(719)	1500-3000	20-35	Typic Haploxeralfs- -fine, mixed, mesic- -Manzanita	alluvial fans & upland slopes	mixed colluvium	CL / C	3-60	S. if above 2500 ft	gravel 5-35	40+	MS	severe	well drn'd	6-9	-compaction -erosion
(721)	1200-4000	30-50	Typic Xerochrepts- -coarse-loamy, mixed, mesic- -Siskiyou	steep hills & mtns.	granitic colluvium	SL / GSL	35-85	varies	gravel 5-35	20-40	M rapid	slight	somewhat excessively drn'd	3	-erosion -slumping -droughty -regeneration
(722)	1200-3000	30-50	Ultic Haploxeralfs- -fine-loamy, mixed, mesic- -Holland	footslopes & alluvial fans	granitic colluvium	L / CL	3-35	varies	gravel 3-25	40+	MS	slight -mod.	well drn'd	6-9	-erosion -slumping -regeneration

(731)	2000-4000	35-60	Dystric Xerochrepts- -loamy-skeletal, mixed, mesic- -Straight	mt'ous slopes	vol-canic	GL/VGCL	35-85	N. if below 2500 ft	gravel 35-75	20-40	M	slight	well drn'd	3-6	-droughty -gravelly -erosion
(732)	2000-4000	35-55	Dystric Lithic Xero-chrepts- -loamy-skeletal, mixed, mesic- -unnamed	mt'ous slopes	vol-canic	VGL/VGL	35-85	N. if below 2500 ft	gravel 35-75	12-20	M	slight	well drn'd	3	-droughty -regeneration -erosion -shallow
(740)	2000-4000	35-60	Pachic Ultic Haplo-xerolls- -loamy-skeletal, mixed, mesic- -Geppert	mt'ous slopes	vol-canic	CbL/VCbCL	35-85	varies	cobbles 35-75	20-40	M	slight	well drn'd	3-6	-droughty -cobbly -erosion -regeneration
(741)	2000-4000	35-60	Ultic Haploxeralfs- -fine, mixed, mesic- -Freezner	mt'ous slopes	vol-canic	L/C	10-60	South	gravel 0-35	40+	MS	severe	well drn'd	6-9	-regeneration -compaction -erosion
(745)	1500-3000	20-35	Pachic Ultic Haplo-xerolls- -fine, montmoril-lonitic, mesic- -Laurelhurst	ter-races & foothill slopes	vol-canic	CL/C	0-65	S. if above 2500 ft	gravel 0-35	40+	S	severe	well drn'd	6-9	-regeneration -compaction -erosion
(750)	2200-4000	35-60	Typic Haploxerults- -clayey, kaolinitic, mesic- -Dumont	ter-races & foothill slopes	vol-canic	CL/C	0-60	South	gravel 0-20	40+	MS	severe	well drn'd	6-9	-compaction -erosion
(770)	1000-5000	25-60	Lithic Xerochrepts- -clayey-skeletal, serpentinitic, mesic- -Pearsoll	mt'ous slopes	ser-pentin-itic collu-vium	CL/CbC	10-85	varies	gravel & cobbles 35-75	12-20	slow	mod.-severe	well drn'd	3	-fertility -erosion -sediment -droughty
(781)	1000-4000	20-35	Typic Xerochrepts- -fine-loamy, mixed, mesic- -Colestine	mt'ous slopes	mixed collu-vium	L/CL	35-60	S. if above 2500 ft	gravel 10-35	20-40	M	slight-mod.	well drn'd	3-6	-erosion -slumping -regeneration
790	4000-5000	12-16	Pachic Argixerolls- -clayey-skeletal, mont-morillontic, mesic- -unnamed	mt'ous slopes	vol-canic	GL/VCbC	10-60	South	gravel & cobbles 45-65	20-40	S	mod.-severe	well drn'd	3	-droughty -gravelly -clayey
806	4000-6000	35-60	Lithic Xerumbrepts- -loamy-skeletal, mixed, frigid- -unnamed	mt'ous slopes	vol-canic	VGL/VGL	2-85	N. if below 4000 ft	gravel 35-75	12-20	M	slight	well drn'd	3	-droughty -gravelly -shallow
809	3500-6000	35-60	Typic Xerumbrepts- -loamy-skeletal, mixed, frigid- -unnamed	mt'ous slopes	vol-canic	GL/VGCL	2-80	N. if below 4000 ft	gravel 35-75	20-40	M	slight	well drn'd	3-6	-droughty -gravelly -slope

810	3500-6000	35-60	Pachic Xerumbrepts- -loamy-skeletal, mixed, frigid- -unnamed	mt'ous slopes	vol-canic	GL / VGCL	2-80	N. if below 4000 ft	gravel 35-75	40+	M	slight	well drn'd	3-6	-droughty -gravelly -regeneration
824	3500-6000	40-80	Dystric Xerochrepts- -loamy-skeletal over fragmental, mixed, frigid- -unnamed	mt'ous slopes	mixed collu-vium	VGL / VGL	5-85	N. if below 4000 ft	gravel 35-75	20-40	M	slight	well drn'd	3-6	-erosion -slumping -regeneration
825	3500-6000	40-80	Dystric Lithic Xerochrepts- -loamy-skeletal over fragmental, mixed, frigid- -unnamed	ridges & side-slopes	mixed collu-vium	GL / C	5-80	N. if below 4000 ft	gravel 5-35	12-20	M-M rapid	slight	well drn'd	3	-shallow -erosion -regeneration -droughty
840	3500-6000	35-55	Pachic Argixerolls- -fine, mixed, frigid- -unnamed	ridges & side-slopes	vol-canic	GL / C	5-80	N. if below 4000 ft	gravel 5-35	40+	MS	severe	well drn'd	6-9	-regeneration -compaction -erosion
842	3500-6000	35-55	Pachic Argixerolls- -clayey-skeletal, mixed, frigid- -unnamed	ridges & side-slopes	vol-canic	GCL / VCbC	5-85+	N. if below 4000 ft	gravel & cob-bles 35-70	20-40	MS	mod.-severe	well drn'd	3	-regeneration -droughty -compaction -erosion
850	3500-5000	30-55	Ultic Haploxerolls- -very fine, montmoril-lonitic, frigid- -unnamed	ridges & side-slopes	vol-canic	CL / C	0-60	N. if below 4000 ft	gravel 0-15	20-40	VS	severe	well drn'd	3-6	-high water table -compaction -erosion
(861)	4000-6000	35-60	Typic Xerochrepts- -coarse-loamy, mixed frigid- -Rogue	mt'ous slopes	gran-itic collu-vium	SL / CbSL	10-85	varies	gravel & cob-bles 10-35	20-40	M. rapid	slight	some-what excess-ively drn'd	3	-droughty -regeneration -sumping -erosion
880	3500-4800	20-35	Pachic Ultic Argi- -xerolls- -fine-loamy, mixed, frigid- -unnamed	ridges & hill slopes	vol-canic	L / CL	2-35	-	gravel 5-35	40+	MS	mod.	well drn'd	6-9	-deer damage
882	4000-6200	20-35	Pachic Ultic Argixerolls- -loamy-skeletal, mixed, frigid- -unnamed	mt'ous slopes	vol-canic	CbL / VCbCL	5-80	South	gravel & cob-bles 35-70	40+	M	slight	well drn'd	3-6	-droughty -deer damage

Key:
- C = clay
- G = gravelly
- L = loam
- V = very
- Cb = cobbly
- Si = silt
- St = stony
- S = sandy

N = north
S = south

M = moderate
S = slow

drn'd = drained

Source: DeMoulin et al. 1975

Appendix G

Water Resources

This appendix presents water yield and water quality data of the major rivers in the JKSYUs. It also describes the major reservoirs and presents water quality data of several.

Table G-1

Major Water Impoundment Reservoirs
within the Jackson and Klamath SYUs

Name	Source of Water	(Full Pool) Surface Size (Acres)	Usable Storage Capacity (Ac/ft)	Present Use 1/	Controlling Agency
Lost Creek Res.	Rogue River	3,440	315,000	E,F,R	U.S Army Corps of Engineers
Howard Prairie	Beaver Creek	2,000	60,500	I,R	Talent Irrigation District
Hyatt Lake	Keene Cr./Howard Pr.	800	16,180	I,R	Talent Irrigation District
Little Hyatt Lake	Howard Prairie	9	70	I,R	Talent Irrigation District
Emigrant Lake	Howard Prairie Canal	900	39,000	E,I,R	Talent Irrigation District
Agate Reservoir	Antelope Cr., Dry Cr. & Butte Cr.	215	4,670	I,R	Rogue River Valley Irrigation District
Keene Cr. Res.	Keene Cr.	2	315	I,R	Talent Irrigation District
Big Bend Res.	Klamath River	500		E,R	Pacific Power and Light Co.
Applegate Res. (Under Const.)	Applegate River	990	82,000	F,R 2/	U.S. Army Corps of Engineers
Elk Creek Res. (Proposed)	Elk Creek	1,290	95,000	F,R 2/	U.S. Army Corps of Engineers

1/ E = Electrical Generation
F = Flood Control
I = Irrigation
R = Recreation

2/ Upon completion

Table G-2

Summary of Water Quality of Selected Reservoirs

Name of Reservoir		pH Units	Turbidity JTUs	Total Solids mg/1	Susp. Solids mg/1	Alka-linity mg/1 as $CaCO_3$	Hard-ness mg/1 as $CaCO_3$	Sul-fate SO_4^- mg/1	Ammonia Nitrogen NH_3-N mg/1	Nitrate Nitrogen NO_3-N mg/1	Soluble Ortho Phos-phate mg/1 as PO_4	Chloride Cl^- mg/1	Sodium $Na+$ mg/1	Potas-sium $K+$ mg/1	Total Phos-phorus mg/1 as PO_4
Emigrant	1972	7.7	23	111	24	60	51.2	4.2	.04	.14	.03	2.3	6.8	1.0	-
	1973	7.7	23	117	40	51	49.6	2.1	.05	<.01	.03	4.7	4.9	0.9	0.1
	1975	7.4	29	141	70	47	47.9	4.0	.01	.05	.06	1.5	4.3	0.8	0.4
	1976	7.7	20	103	23	51	53.5	3.6	<.01	-	.04	1.8	2.7	0.8	0.4
Howard	1972	7.4	3	44	4	27	20.5	0.3	.01	.04	.01	1.0	4.1	0.5	-
Prairie	1973	7.2	3	47	7	27	25.4	0.5	<.01	< 0.1	.02	2.1	2.3	0.7	0.1
	1975	7.1	3	47	6	25	23.7	1.2	<.01	.04	.03	1.0	2.2	0.5	0.1
	1976	7.1	1	47	1	29	27.8	0.8	.01	-	.01	0.8	1.4	0.5	0.1
Hyatt	1972	7.9	3	65	4	40	30.4	0.7	<.01	.14	.03	0.7	3.8	0.5	-
	1973	8.9	4	74	10	37	36.3	0.5	.06	<.01	.05	3.1	2.8	0.4	0.1
	1975	7.1	3	47	6	25	23.7	1.2	<0.01	.04	.03	1.0	2.2	0.5	0.1
	1976	7.7	2	66	2	35	32.2	0.8	<.01	-	.01	1.3	1.5	0.4	0.2

Source: Oregon Department of Environmental Quality, Unpublished data, 1973-5

Table G-3

Water Quality of Major Rivers

	Dissolved O		Total Dissolved Solids	Turbidity	NO^3&NO^2-N	Total PO_4	Suspended Sediment
	mg/l	sat(%)	mg/l	JTU	mg/l	mg/l	mg/l
Rogue River							
at Laurelhurst Park	9.0-13.4	90-115	10-180	0-29	0.01-0.1	0.1-0.3	65.11
at Grants Pass	8.1-13.5	87-135	46-90	1-15	0.06-0.24	0.2-0.7	76
Applegate River							
at McKee Bridge	9.0-11.7	98-100	-	1-45	0.01-0.22 1/	0.6 2/	98.25
at Applegate	8.1-12.8	84-147	30-179	0-48	0-0.29 1/	0.1-0.8	111.39
Klamath River							
at Big Bend	0.9-15.5	-	90-564	2-56	0.02-2.3	0.4-1.0	168.7
at Iron Gate, Calif.	5.9-12.2	-	-	1-30	-	-	-

1/ NO^3-N only
2/ 2 samples only

Sources: ODEQ 1976; USDI, GS 1976; ODEQ Storet Data

Table G-4

Water Quality Data for Rogue River near Agness, Oregon - Water Year October 1974 to September 1975

Date	Specific Conductance (micro-mhos)	pH	Turbidity (JTU)	Suspended Sediment (mg/l)	Suspended Sediment Tons/day	Temperature °C	Temperature °F	Fecal Coliform Col/100ml	Streptococci Colonies per 100 ml	Total Organic Carbon (mg/l)	Phytoplankton cells/ml
10/22	122	7.5	—	4	15	11.5	52.7	8	—	—	—
11/18	119	7.2	1	38	214	9.0	48.2	70	48	—	1400
12/19	111	7.1	7	9	107	7.0	44.6	—	22	—	890
1/28	105	6.6	10	22	440	4.5	40.1	40	20	2.8	340
2/19	90	7.2	60	31	1330	5.5	41.9	42	1.75	—	120
3/19	160	7.1	400	2600	638000	6.0	42.8	1160	1400	—	650
4/23	173	7.3	5	22	456	10.5	50.9	4	10	5.7	1100
5/22	99	7.3	7	67	1420	12.5	54.5	13	7	—	530
6/18	69	7.3	3	30	436	16.0	60.8	14	22	—	1500
7/23	93	7.5	2	8	41	22.0	71.6	4	2	3.2	3700
8/20	99	7.4	3	12	65	18.0	64.4	8	100	—	3200
9/24	112	7.7	1	6	25	17.5	63.5	3	4	—	1900

Source: USDI, GS 1976

Table G-5

Chemical Quality of Rogue River near Agness, Oregon for Water Year October, 1974 to September 1975

Date	Instantaneous Discharge ft^3/sec (flow rate)	SiO_2 (mg/l) (silica)	Ca^{++} (mg/l) (calcium)	Mg^{++} (mg/l) (magnesium)	Na^+ (mg/l) (sodium)	K^+ (mg/l) (potassium)	HCO_3^- (mg/l) (bicarbonate)	$CO_3^=$ (mg/l) (carbonate)	$SO_4^=$ (mg/l) (sulfate)	Cl^- (mg/l) (chloride)	F^- (mg/l) (fluoride)	Nitrate & Nitrite (mg/l)	Total N (mg/l)	Total P (mg/l)	Total Dissolved Solids (residue) (mg/l)	(sum) (mg/l)	(tons/day)	(tons/acre foot)	Ca+Mg Hardness (mg/l)
10/22	1,400	29	11	3.1	5.2	1.5	59	--	3.1	3.1	0.1	--	--	0.08	--	86	325	0.12	40
11/18	2,090	25	11	4.3	5.5	1.6	62	--	4.5	5.8	0.0	0.06	0.65	0.09	102	88	576	0.14	45
12/19	4,400	23	9.7	3.8	4.9	0.9	51	--	3.2	3.1	0.0	0.12	0.27	0.13	83	74	986	0.11	40
1/28	7,400	21	9.7	3.7	2.2	1.1	46	--	2.9	3.4	0.1	0.13	0.31	0.07	83	67	1,660	0.11	39
2/19	15,900	15	8.6	4.0	3.9	0.8	44	--	2.8	1.9	0.0	0.15	4.2	0.16	59	59	2,530	0.08	38
3/19	90,900	14	8.8	3.3	15	1.3	42	0	4.0	5.7	0.3	0.02	1.4	1.1	118	73	29,000	0.16	36
4/23	7,680	20	12	3.7	4.4	1.1	56	0	2.5	1.8	0.1	0.08	0.14	0.06	67	74	1,390	0.09	45
5/22	7,850	18	7.4	2.9	7.9	0.9	43	0	2.4	1.5	0.1	0.04	0.06	0.05	55	62	1,170	0.07	30
6/18	5,380	19	8.1	2.3	3.5	0.9	38	0	3.0	0.8	0.0	0.01	0.68	0.05	57	56	828	0.08	30
7/23	1,910	25	9.5	3.4	4.9	1.3	49	0	4.8	1.8	0.1	0.01	0.17	0.08	74	75	382	0.10	38
8/20	2,020	26	9.6	3.3	5.6	1.4	55	0	2.3	2.3	0.1	0.10	0.26	0.13	75	78	409	0.10	38
9/24	1,550	26	11	0.8	6.4	1.5	56	0	2.3	2.5	0.1	0.03	0.54	0.10	76	78	318	0.10	31

N = nitrogen

P = phosphorous

(Source: USDI, GS 1976)

Table G-6

Chemical Quality of Klamath River below Iron Gate, California for Water Year October, 1974 to September 1975

Date	Instantaneous Discharge ft^3/sec (flow rate)	Na^+ (mg/l) (sodium)	Fe (ug/l) (Iron)	HCO_3^- (mg/l) (bicarbonate)	$CO_3^=$ (mg/l) (carbonate)	Cl^- (mg/l) (chloride)	Total Nitrate (N) (mg/l)	Total Kjeldahl Nitrogen (N) (mg/l)	Total P (mg/l)	Ca+Mg Hardness (mg/l)
10/08	1590	—	—	—	—	—	—	—	—	—
11/07	2950	17	—	96	0	4.0	0.75	—	—	57
12/09	2900	—	—	—	—	—	—	—	—	—
1/15	3080	—	—	—	—	—	—	—	—	—
2/18	3160	—	—	—	—	—	—	—	—	—
3/18	5880	16	3100	84	0	4.2	0.56	1.0	0.26	67
4/15	4300	—	—	—	—	—	—	—	—	—
5/05	4740	16	430	82	0	4.2	0.10	0.80	0.10	56
6/03	1260	—	—	—	—	—	—	—	—	—
7/17	992	—	—	—	—	—	—	—	—	—
8/06	992	—	—	—	—	—	—	—	—	—
9/18	1600	—	—	—	—	—	—	—	—	—

N = nitrogen
P = phosphorus

Source: USDI, GS 1976

Table G-7

Water Quality Data for Klamath River below Iron Gate Dam, California - Water Year 1975

Date	Specific Conductance (micro-mhos)	pH	Turbidity (JTU)	Temperature °C	Temperature °F	Dissolved Oxygen (mg/1)
10/08	205	8.0	2	15.0	59.0	5.9
11/07	176	7.2	1	10.0	50.0	9.2
12/09	179	7.2	6	7.0	44.6	10.5
1/15	163	7.4	10	2.0	35.6	12.2
2/18	176	7.4	10	3.0	37.4	12.0
3/18	190	7.5	30	7.0	44.6	12.1
4/15	176	7.8	10	7.5	45.5	11.6
5/05	188	7.8	3	10.0	50.0	10.4
6/03	143	8.2	3	17.0	62.6	10.2
7/17	157	8.1	2	—	--	9.2
8/06	166	8.4	3	21.0	69.8	9.1
9/18	197	8.0	1	19.0	66.2	8.0

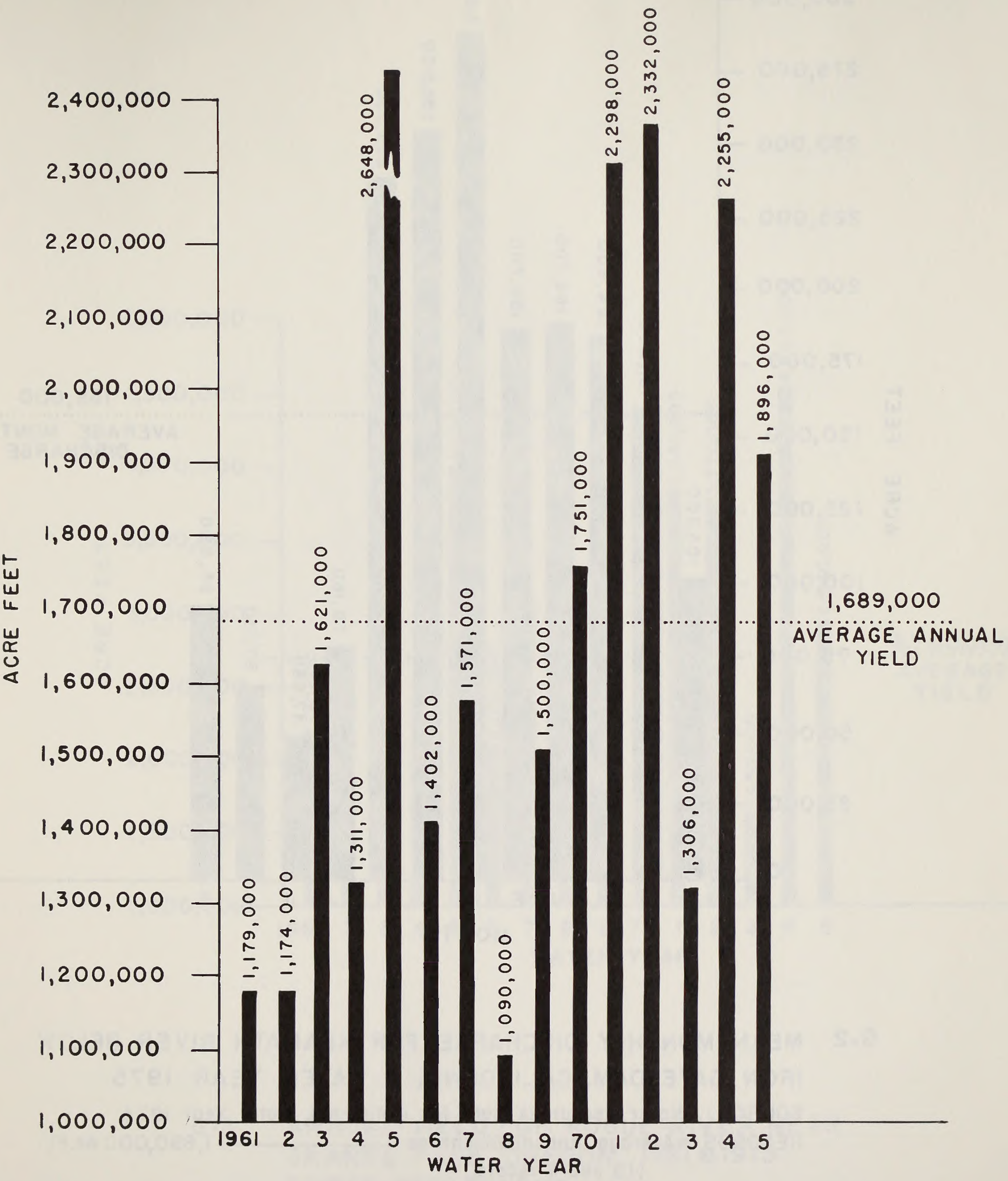
Source: USDI, GS 1976

Table G-8

Water Yield for Major Rivers

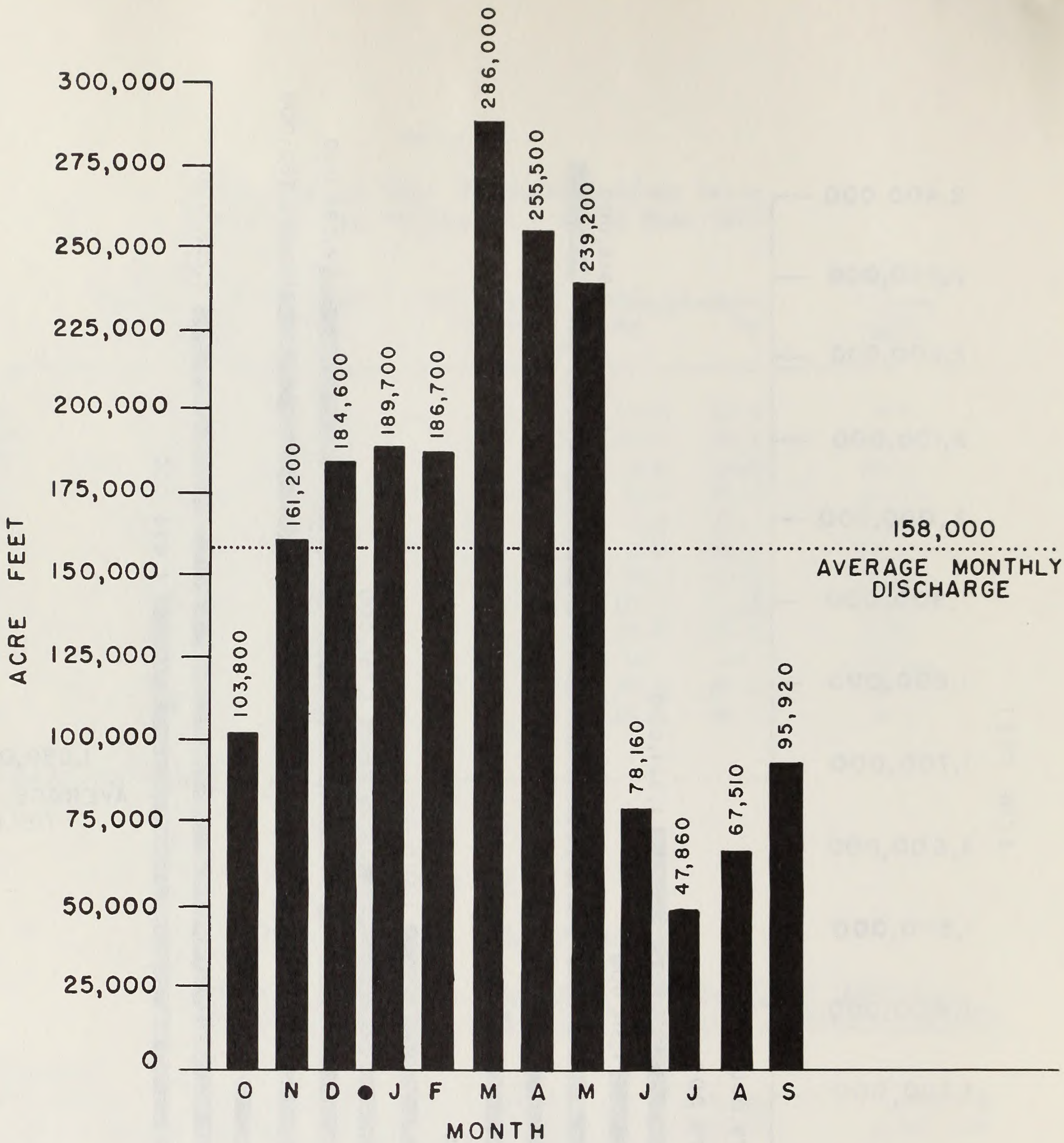
	Max. Daily Discharge (Ft^3/Sec)		Annual Yield (Acre-Ft.)	
	Period of Record	WY 1975	Period of Record	WY 1975
ROGUE RIVER				
at Prospect	10,900	4,490	893,300	1,202,000
at Grants Pass	152,000	56,000	2,589,000	2,951,000
APPLEGATE RIVER				
at Copper	29,800	6,790	330,400	340,800
at Applegate	37,200	12,600	409,300	437,900
KLAMATH RIVER				
at Keno	10,100	6,200	1,232,000	1,433,000
at Iron Gate, CA	29,400	8,260	1,677,000	1,896,000

Source: USDI, GS 1975; 1976



G-1 ANNUAL YIELD FOR KLAMATH RIVER BELOW IRON GATE DAM, CALIFORNIA 1961 ● 1975

SOURCE: USGS File Data



G-2 MEAN MONTHLY DISCHARGE FOR KLAMATH RIVER BELOW IRON GATE DAM, CALIFORNIA • WATER YEAR 1975

SOURCE : Water Resources Data for California, Water Year 1975

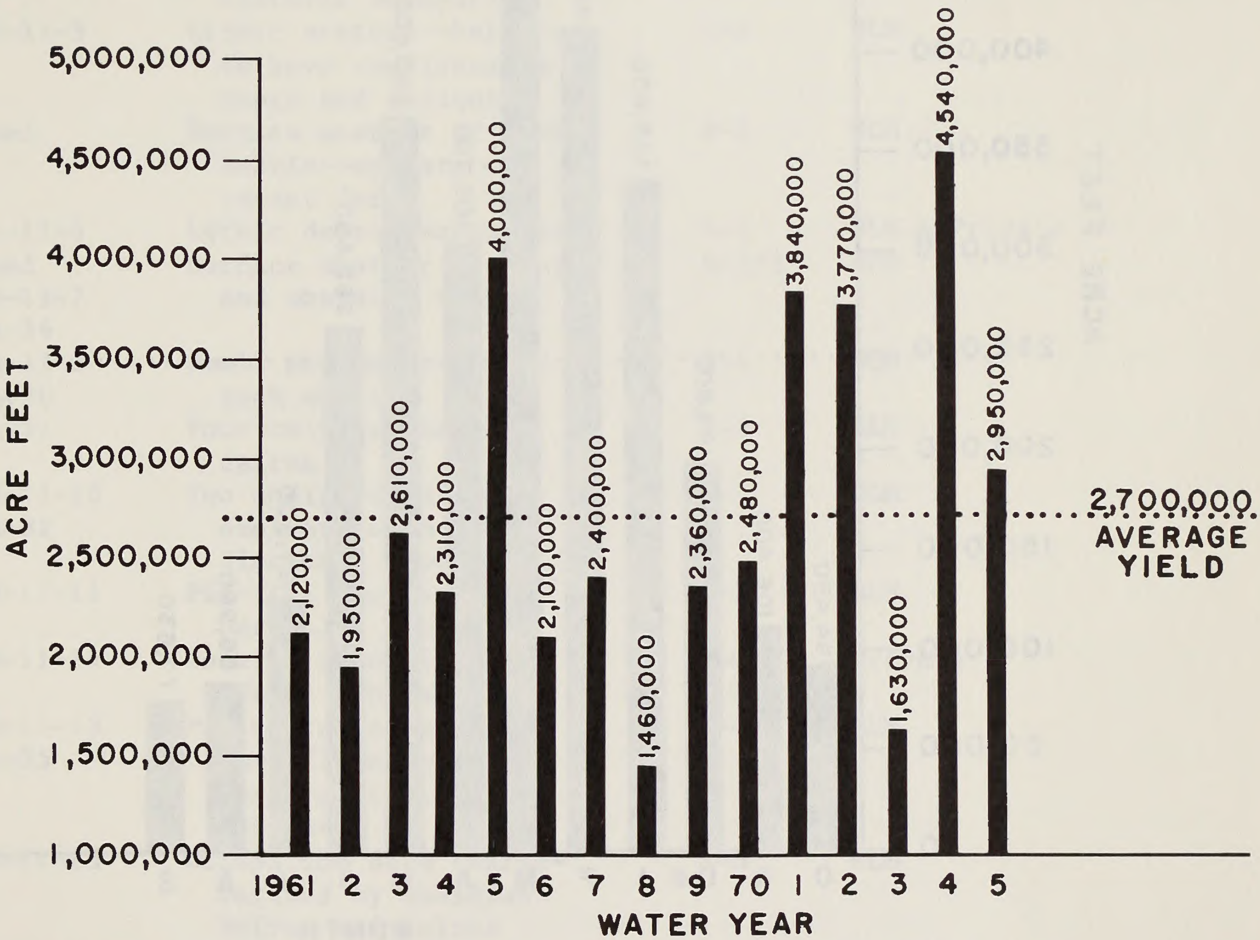
RECORDS: • Average Annual Discharge —————— 1,690,000 Ac. Ft.
(15 years record)

• Average Discharge, WY 1975 —————— 1,896,000 Ac. Ft.

• Maximum Daily Discharge —————— 29,400 Ft.3/Sec.
Dec. 22, 1964

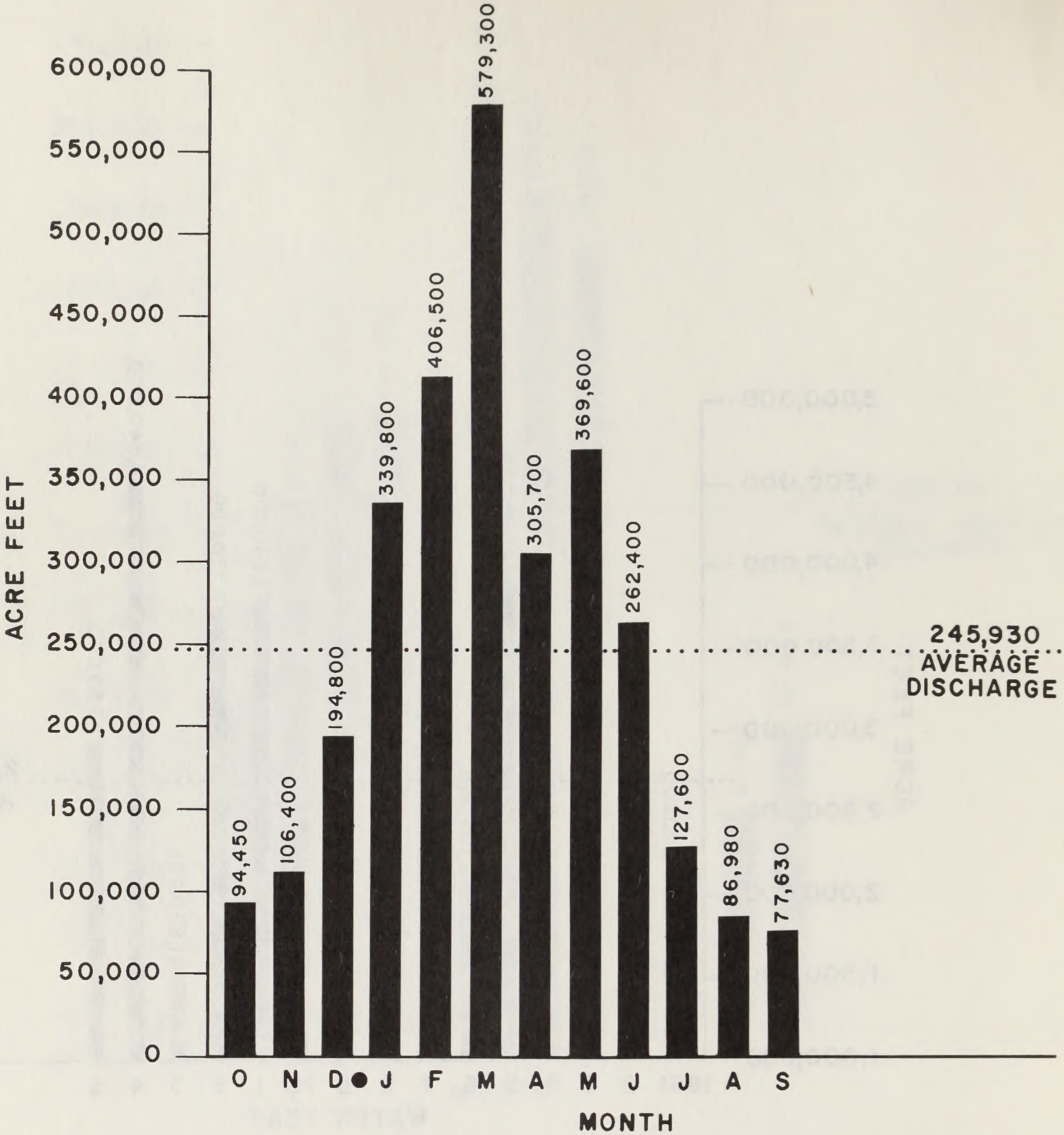
• Minimum Daily Discharge —————— 647 Ft.3/Sec.
Oct. 30, Nov. 6, 1960, Sept. 24, Oct. 1, 1961

• Average Daily Discharge —————— 2,332 Ft.3/Sec.
(15 years record)



G-3 ANNUAL YIELD FOR ROGUE RIVER NEAR GRANTS PASS OREGON 1961 ● 1975

SOURCE: USGS File Data



G-4 MEAN MONTHLY DISCHARGE FOR ROGUE RIVER AT GRANTS PASS, OREGON • WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

RECORDS:
- Average Annual Discharge (37 years record) — 2,592,000 Ac. Ft.
- Average Discharge, WY 1975 — 2,951,000 Ac. Ft.
- Maximum Daily Discharge Dec. 23, 1964 — 152,000 Ft.^{3}/Sec.
- Minimum Daily Discharge Jan. 30, 1961 — 195 Ft.^{3}/Sec.
- Average Daily Discharge (37 years record) — 35,780 Ft.^{3}/Sec.

APPENDIX H

Archeological Sites

Archeological Site	Attributes/Condition	Significance Rating	Jurisdiction
35-AR-11-1	Lithic scatter-considerable line depth	S-2	BLM
35-AR-11-2	Obsidian scatter; site of historic occupation	S-3	BLM
35-AR-11-3	Lithic scatter--believed to have considerable depth and antiquity	S-2	BLM
Unnamed	Surface scatter of lithic debris--appears of recent date	S-3	BLM
35-AR-11-5	Lithic debris-vandalized	S-3	BLM & Private
Unnamed 35-AR-11-7 35-JA-34	Surface scatter of chert and obsidian flakes	S-2/3	BLM
35-AR-11-8 35-JA-30	Small partially potted rock shelter	S-3	BLM
35-JA-31	Four columnar basalt cairns	S-3	BLM
35-AR-11-10 35-JA-32	Two undisturbed rock shelters with fire blackened roofs	S-2	BLM
35-AR-11-11	Pit-like depressions-partially excavated	S-3	BLM
35-AR-11-14	Several pits with lithic debris	S-3	Private
35-AR-11-13 35-JA-35	Pit depressions with some flakes and cores-partially excavated	S-3	BLM
35-AR-11-15	Occupation site characterized by obsidian knives and points	S-3	BLM
35-AR-11-16	Flakes and obsidian artifacts	S-3	Private
35-AR-11-17	Shows signs of extensive aboriginal occupation-including housepits	S-3	BLM & Private
35-AR-11-18	Chert and obsidian flakes - vandalized	S-3	Private
35-AR-11-20	Lithic scatter	S-3	Private
35-AR-11-21	Chert, obsidian flakes, and partial artifacts	S-3	BLM & Oregon
35-AR-11-22	Surface scatter of obsidian flakes	S-3	Private

APPENDIX H (Continued)

Archeological Site	Attributes/Condition	Significance Rating	Jurisdiction
35-AR-11-23	Chert and obsidian flakes	S-3	Private
35-AR-11-24	Obsidian flakes and partial artifacts	S-3	Private
35-AR-11-25	Scatter of obsidian flakes	S-3	BLM
35-AR-11-26	Scatter of jasper and obsidian flakes	S-3	Private
35-AR-11-27	Jasper and obsidian flakes -- extensive	S-3	Private
35-AR-11-28	Jasper and obsidian flakes	S-3	Private
35-AR-11-29	Scatter of chert; jasper, and obsidian flakes	S-3	Private
35-AR-11-30	Light scatter of jasper and obsidian flakes	S-3	BLM
35-AR-11-31	Light scatter of jasper and obsidian flakes	S-3	BLM
35-AR-11-32	Jasper and obsidian flakes - vandalized	S-3	BLM
35-AR-11-33	Jasper and obsidian flakes - vandalized	S-3	BLM
35-AR-11-34	Heavy concentration of jasper and obsidian flakes	S-3	BLM
35-AR-11-35	Light scatter of obsidian flakes	S-3	BLM
35-AR-11-36	Pit-like depressions	S-3	BLM
35-AR-11-37	Small scatter of jasper and obsidian flakes	S-3	BLM
35-AR-11-38	Scatter of jasper and obsidian flakes	S-3	BLM
35-AR-11-39	Extensive flake scatter-- some historical significance	S-3	BLM
35-AR-11-40	Grave in a basalt outcrop	S-3	BLM
35-HS-11-36 35-AR-11-41	Scatter of jasper and obsidian flakes	S-3	BLM

Appendix I

Economic Impact Calculation Procedures

Direct Income Calculation

The direct local community personal income generated by timber harvest and processing is derived by 1) multiplying estimated direct employment by the direct employment-related income from average 1976 lumber and wood products per employee, and 2) adjusting this to account for income to proprietors.

Direct employment-related incomes from average covered lumber and wood products payroll per employee in 1976 were $14,120, $13,560, $13,090, and $14,180 for Douglas, Jackson, Josephine, and Klamath Counties respectively.

The adjustment coefficients used to derive total income from lumber and wood products payrolls is given in Table I-1, and reflects the ratio of lumber and wood products industry payrolls to total lumber and wood products earnings.

An example of the calculation procedure for deriving direct local community personal income is presented below.

1980 Direct Employment Douglas County (current management) = 40

Douglas County Direct employment-related income from average covered lumber and wood products payroll per employee = $18,120

1980 adjustment coefficient = 1.16

1980 projected direct income = $655,168
40 X $14,120 = $564,800
$564,800 X 1.6 = $655,168

Table I-1

Community Personal Income Coefficients

Douglas County	1971	1972	1973	1974	1975	1980 1/	1990 1/
A. Lum & Wood Payroll	78,608	91,249	101,492	104,815	100,404		
B. Ttl lum & Wood Erngs	84,818	99,576	111,000	114,883	112,671		
Ratio B/A	1.08	1.09	1.09	1.10	1.12	1.16	1.25
Jackson County							
A. Lum. & Wood Payroll	46,019	55,334	59,462	56,498	55,723		
B. Ttl Lum & Wood Erngs	49,775	60,911	65,445	62,531	61,146		
Ratio B/A	1.08	1.10	1.10	1.11	1.10	1.13	1.18
Josephine County							
A. Lum & Wood Payroll	17,912	21,509	23,290	21,348	23,829		
B. Ttl Lum & Wood Erngs	19,853	24,377	26,673	24,692	26,481		
Ratio B/A	1.11	1.13	1.15	1.16	1.11	1.15	1.18
Klamath County							
A. Lum & Wood Payroll	34,318	41,010	46,253	50,477	49,691		
B. Ttl Lum & Wood Erngs	36,364	43,503	49,382	54,033	55,077		
Ratio B/A	1.06	1.06	1.07	1.07	1.11	1.15	1.26

1/ Projections based on trend line analysis

Tax Rate Equivalence of O&C Payments

The tax rate equivalence of O&C payments is derived by multiplying the average annual timber harvest by the expected stumpage price per thousand board feet ($154 in 1980 and $204 in 1990). The product is adjusted by the proportion of these O&C payments that the county receives. For every $100 of O&C receipts, the O&C counties receive $50, the southwest Oregon counties receive $31.19, Douglas County receives $12.53, Jackson County receives $7.48, Josephine County receives $6.04 and Klamath County receives $1.17. These public revenues are then divided by the true cash value of the appropriate county or counties (Table I-2) to derive the tax rate equivalence of O&C payments.

Table I-2

True Cash Value of Property within Oregon Counties

($1,000)

County	1974	1975	1976	74-76 Total	74-76 Average	1977
Benton	570,191	649,143	720,038	1,939,372	646,457	886,698
Clackamas	2,435,075	2,760,630	3,060,551	8,256,256	2,752,085	3,478,008
Columbia	577,771	712,005	880,454	2,170,230	723,410	994,254
Coos	695,310	761,407	842,962	2,299,679	766,560	950,099
Curry	214,863	240,138	256,692	711,693	237,231	291,689
Douglas	1,378,829	1,559,695	1,639,097	4,577,621	1,525,874	1,836,394
Jackson	1,156,440	1,349,788	1,499,521	4,005,749	1,335,250	1,698,640
Josephine	465,547	551,755	594,519	1,611,821	537,274	702,737
SW Oregon						
Klamath	752,284	802,197	885,904	2,440,385	813,462	1,004,600
Lane	2,662,193	3,084,637	3,564,716	9,311,546	3,103,849	4,133,927
Lincoln	545,469	602,022	686,937	1,834,428	611,476	840,868
Linn	1,173,941	1,273,960	1,386,852	3,834,753	1,278,251	1,583,999
Marion	1,649,864	1,991,636	2,110,556	5,752,056	1,917,352	2,491,925
Multnomah	6,708,841	7,186,624	7,896,145	21,791,610	7,263,870	9,009,397
Polk	407,167	445,611	501,674	1,354,452	451,484	585,228
Tillamook	306,198	330,230	352,074	988,502	329,501	429,547
Washington	2,275,641	2,664,804	3,070,517	8,010,962	2,670,321	3,558,602
Yamhill	477,540	538,813	614,577	1,630,930	543,643	699,010
All O&C Counties	24,453,164	27,505,095	30,563,786	82,522,045	27,507,350	35,175,62

Source: Based on Summaries of Assessment rolls from 1974-1977.

Glossary

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GLOSSARY OF TERMS

A-weighted Sound Scale - A sound scale with sound pressure level deemphasizing lower frequencies and slightly emphasizing frequencies between 1000 and 5000 Hz. The A-weighting curve is designed to simulate the human hearing mechanism's frequency response.

Absorb - To be held within the structure of a substance.

Acre-foot - The volume of water that will cover 1 acre to a depth of 1 foot.

Adsorb - To be held to the surface of a substance.

Allowable Cut - The amount of forest products that may be harvested annually or periodically from a specified area over a stated period in accordance with the objectives of management.

Allowable Cut Effect (ACE) - The immediate increase in today's allowable cut which is justified by expected future increases in yields due to present or proposed management treatments.

Allowable Cut Planning System - A process which deals with the steps involved in the development and evaluation of alternative levels of timber production for the purpose of establishing an allowable cut.

Ambient - Surrounding, on all sides; for air, refers to any unconfined portion of the atmosphere.

Anadromous Fish - Fish which migrate from the sea to breed in fresh water. Their offspring return to the sea.

Angler Day - An angler day as defined by the Oregon Department of Fish and Wildlife is any angler visit during one day for the purpose of fishing.

Animal Unit - One mature cow, one horse, five sheep, six deer or equivalent numbers of other herbivorous species.

Animal Unit Month (AUM) - The amount of forage (of any combination of vegetative species) necessary for the subsistence, in a healthy state, of one mature cow (and calf under 6 months) for a period of 1 month.

AQCR - Air Quality Control Region, State of Oregon.

AQMA - Air Quality Management Area, State of Oregon.

Archeological Resources - All evidences of past human occupations other than historical documents, which can be used to reconstruct the lifeways of past peoples. These include sites, artifacts, environmental data and all other relevant information.

Aspect - The direction a slope faces.

Average Employment - The sum of number of employees, reported monthly, divided by twelve; because employment is reported for all employees working during any one month, it is a modest over-estimate of full-time equivalent employment.

Background Levels - Amounts of pollutants present from natural sources and from human disturbances which have reached equilibrium.

Basal Area - The area of the cross section at breast height of a single tree or of all the trees in a stand, usually expressed in square feet.

Bedload - The sediment that moves by sliding, rolling or bounding, on or very near, the streambed.

Board Foot - A unit of solid wood, 1-foot square and 1-inch thick.

British Thermal Unit (BTU) - A unit of heat equal to 252 calories; quantity of heat needed to raise the temperature of one pound of water from 62° F. to 63° F.

Bucking - Cutting trees into log lengths.

Bureau Planning System - A process used in the BLM to establish land use allocations, constraints, and objectives for various categories of public land use.

Carcinogenicity - Ability to cause cancer.

Class I Streams - Waters classified by the State of Oregon as valuable for domestic use, important for recreation or significant for the reproduction of fishes.

Class II Streams - Waters designated by the State of Oregon as headwater streams or minor drainages that generally are of limited or no value for fishing or other forms of recreation.

Clearcutting - A method of timber harvesting in which all trees, merchantable or unmerchantable, are cut from an area.

Commercial Forest Land - Forest land that is now producing or is capable of producing at least 20 cubic feet per acre per year of commercial coniferous tree species.

Commercial Thinning - Removal of merchantable surplus trees.

Community Income Effect - The sum of direct and indirect personal income generated by a change, e.g., timber harvest. Indirect personal income results from economic activity stimulated in other local enterprises by purchase of goods and services, primarily of a support nature.

Contrast Rating - A method of determining the extent of visual impact for an existing or proposed activity that will modify any landscape feature.

Critical Habitat - That habitat considered by the Secretary of the Interior to be necessary to the normal needs or survival and recovery of listed Threatened or Endangered Species. It may also include habitat not currently occupied into which a listed species could expand.

Cull - A tree or log which is rejected because it does not meet certain specifications.

Decibel (dB) - A logarithmic measure of sound pressure.

Discharge - Rate of flow of a fluid the volume of fluid passing a point per unit of time, commonly expressed as cubic feet per second (cfs), million gallons per day, gallons per minute, or cubic meters per second.

Ecosystem - An ecological unit consisting of both living and nonliving components which interact to produce a natural, stable system. Endemic - A species that is restricted to a relatively small geographic area or to an unusual or rare type of habitat.

Environmental Assessment Report (EAR) - A systematic environmental analysis of site-specific BLM activities. Used to determine whether such activities have a significant affect on the quality of the human environment and whether a formal environmental statement is required.

Environmental Statement (ES) - A formal document to be filed with the Environmental Protection Agency that considers significant environmental impacts expected from implementation of a major Federal action.

Erosion (soil) - Removal of soil from its place of origin to a point of deposition other than a stream channel.

Falling/Felling - Cutting down trees.

Fauna - All the animals in a given area.

Fetotoxicity - Toxic to the fetus or the developing individual in the egg or uterus, especially in the later stages of development.

Final Harvest Cut - Constitutes removal of a mature stand, either through clear cutting, the final stage of a shelterwood regime, or overstory removal.

Flora - All the plants in a given area.

Forbs - Herbaceous plants; most often used pertaining to herbaceous plants eaten by wildlife.

Forest Land - Land that is now, or is capable of becoming, at least 10 percent stocked with forest trees and that has not been developed for nontimber use.

Forest Management Program - Includes timber activity plan and all forest resource related program activity plans.

Forest Type Island - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement and condition to be distinguishable from vegetation on adjoining areas.

Gross Yarding - Yarding unmerchantable logging residue to the concentration points.

Groundwater - Subsurface water in the zone of saturation.

Growing Stock - The amount of standing, green timber retained to produce forest products; also known as forest capital.

Habitat - The environment in which an organism occurs.

Hertz - A measure of sound frequency equal to one cycle per second.

High Intensity Forest Management Lands - All commercial forest land that is part of the timber production base for allowable cut calculation in the Jackson and Klamath Sustained Yield Units.

Igneous Rock - Rock formed from the cooling and solidification of molten rock.

Indicator Plant Species - A plant that, by its occurrence, vigor or frequency, indicates a particular property of a site. Soil type is generally, but not exclusively, the controlling site factor.

Infiltration (soil) - Downward entry of water into the soil.

Intermediate Cuttings - Any removal of merchantable trees from a stand prior to the final harvest cutting, i.e., commercial thinning, sanitation/salvage, or shelterwood regeneration cuttings.

International Log Rule - A log rule derived from a formula which allows a 1/2-inch taper for each 4 feet of log length and 1/16-inch shrinkage for each one-inch board; in one form it assumes a 1/8-inch saw kerf (International 1/8-inch Log Rule) and in a modified form it assumes a 1/4-inch saw kerf (International 1/4-Log Rule).

LD_{50} - A standard measure of toxicity: the lethal dose rate of a substance that will kill 50 percent of a group of experimental organisms usually expressed in terms of milligrams of chemical per kilogram of test animal body weight (mg/kg).

Landing - Any place on or adjacent to the logging site where logs are assembled for further transport.

Landscape Character - The arrangement of a particular landscape as formed by the variety and intensity of the basic elements of form, line, color and texture.

Leach - Usually refers to the movement of chemicals through soil by water; may also refer to movement of herbicides out of leaves, stems or roots into the air or soil.

Log Flows - Destinations of harvested timber by origin. Origins used herein are management units and counties or county groupings; destinations are communities, counties or groupings of counties within which the primary processing of timber takes place.

Log Rule - A procedure for estimating the board foot volume of logs of given length and diameter.

Low Intensity Forest Management Lands - Commercial forest lands withdrawn from the timber production base since the regeneration period is expected to exceed 5 years; included in the proposal for trial harvest.

Lumber and Wood Products, except Furniture - Defined by the Office of Management and Budget the Standard Industrial Classification Manual as Major Group #24, which includes logging contractors engaged in cutting timber and pulpwoods; merchant sawmills, lath mills, shingle mills, planing mills, plywood mills, and veneer mills engaged in producing lumber and wood basic materials; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes. Certain types of establishments producing wood products are classified elsewhere, e.g., furniture and office and store fixtures are classified in Major Group #25.

Management Framework Plan (MFP) - Land use plan for public lands which provides a set of goals, objectives, and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

Mass Failure - See Mass Movement.

Mass Movement - Downslope movement of soil and rock caused by gravity; may be slow (creep) or rapid (landslide, debris avalanche).

Metamorphic Rock - Rock formed from preexisting rocks but changed by heat and/or pressure to rock with new physical, chemical and mineralogical properties.

Microclimate - The climatic condition of a small area modified from the general climatic conditions by local differences in elevation or exposure.

Mixing Height - The height above the ground through which vertical mixing is relatively vigorous.

Mortality-Salvage - See sanitation/salvage cutting.

Multiple Use - Management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people.

Mutagenicity - Ability to cause or induce a mutation, that is, a sudden change in the characteristics of an organism which is capable of being transmitted to offspring.

National Register of Historic Places (National Register) - Established by the Historic Preservation Act of 1966. A listing maintained by the National Park Service of architectural, historical, archeological and cultural sites of local, state or national significance. Sites are nominated to the Register by the states and by Federal agencies. Copies of the National Register are available from the Superintendent of Documents, USGPO, Washington, D.C. 20402.

Non-commercial Forest Land - Land which is not capable of yielding at least 20 cubic feet of wood per acre per year from commercial species, or land which is capable of producing only non-commercial tree species.

Non-degradation Policy - Use of the highest and best practicable treatment and/or control of wastes, activities and flows to maintain water quality at the highest possible levels.

Non-forest Land - Land that has been developed for non-timber uses or land that is incapable of being 10 percent stocked with forest trees.

Non-point Source Pollution - Pollution caused by the introduction of materials from diffuse sources (e.g., sediment, nutrients), or from a natural or manmade alteration in the stream system.

O&C Lands - Public lands granted to the Oregon and California Railroad Company and subsequently revested to the United States.

Octave Band Sound Pressure Level - The sound pressure level of that portion of the total sound which lies between a band of frequency whose highest component is double that of the lowest frequency component, for example, 707 and 1414 Hertz.

ODEQ - Oregon Department of Environmental Quality.

Old-Growth Dependent - An animal species so adapted that it can exist only in old-growth forests.

Operations Inventory - An intensive forest inventory which provides managers with information showing the location, acreage, silvicultural needs, and mortality-salvage or thinning needs within each section of public land.

Paleontology - A science dealing with the life of past geological periods as known from fossil remains.

Partial Cutting - Tree removal other than by clearcutting.

Particulates - Finely divided solid or liquid particles in the air or in an emission; includes dust, smoke fumes, mist, spray and fog.

Peak Flow - The highest amount of flow occurring in a year or for a single storm event.

Permeability (soil) - The quality of a soil horizon that enables water or air to move through it; may be limited by the presence of one nearly impermeable horizon even though the others are permeable.

Personal Income - the income received by all individuals in the economy from all sources; made up of wage and salary disbursements, proprietors income, rental income of persons, dividends, personal interest income, and the difference between transfer payments and personal contributions for social insurance.

Phytoplankton - Suspended, floating or weakly swimming microscopic aquatic plants.

Plankton - Organisms of relatively small size, mostly microcscopic, that either have relatively small powers of locomotion or drift in the water subject to the action of waves and currents.

Plant Community - An association of plants of various species found growing together in different areas with similar site characteristics.

Precommercial Thinning - Removal of surplus trees in a stand prior to their reaching merchantable size.

Public Lands - Any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management. May include public domain, O&C or acquired lands in any combination.

Public Domain Lands - Original holdings of the United States never granted or conveyed to other jurisdictions.

Recharge - Process by which water is added to the zone of saturation, as in recharge of an aquifer.

Reforestation - Reestablishment of a tree crop on forest land.

Regeneration - The renewal of a tree crop, whether by natural or artificial means; also, the young crop itself.

Regeneration Cut - One of the phases of shelterwood cutting designed to open the canopy of a stand sufficiently to allow the establishment of regeneration, i.e, either the first stage of a two-stage shelterwood cutting or the second stage of a three-stage shelterwood cutting.

Regeneration Period - The time it takes for a new coniferous timber stand to become established following the final harvest cut.

Relict - A remnant or fragment of a flora that remains from a former period when it was more widely distributed.

Riparian - Pertaining to natural communities which develop on or near the banks of a body of water.

Runoff - That part of precipitation, as well as any other flow contributions, which appears in surface streams, either perennial or intermittent.

Sanitation/Salvage Cutting - Removal of individual trees killed or injured by fire, insects, disease, etc., and the removal of those trees likely to die prior to final harvest cut so as to utilize merchantable material.

Savanna - A grassy expanse with scattered clumps of trees.

Sawlog - A log considered suitable in size and quality for producing sawn timber.

Scarification - Disturbance of the upper soil layer by mechanical means in preparing a site for seeding or planting.

Scenic Quality - The quality of the scenery as determined through the use of the scenic evaluation process.

Scribner Decimal C Log Rule - A derivation of the Scribner Log Rule whereby volumes are rounded to the nearest ten board feet and are listed in tens of board feet. Volumes given in table of this rule must be multiplied by 10 to obtain the actual board foot content.

Scribner Log Rule - A log rule constructed from diagrams which shows the number of 1-inch boards which can be drawn in a circle representing the small end of a log; assumes a 1/4-inch saw kerf, makes a liberal allowance for slabs, and disregards taper.

Sediment Yield - The quantity of sediment, measured in dry weight or by volume, transported through a stream cross-section in a given time. Consists of both suspended sediment and bedload.

Sedimentary Rock - A rock formed from materials deposited from suspension or precipitated from solution and usually more or less consolidated; e.g. sandstone, shale, limestone and conglomerates.

Sensitivity Levels - An index of the relative importance or volume of visual resonse to an area in relation to other areas in the planning unit.

Shelterwood Cutting - A series of partial cuttings designed to establish a new crop of trees under the protection of the old.

Silviculture - The art of producing and tending a forest.

Siphon - A pipe which uses atmospheric pressure to transfer water from one point to another against gravity.

Site Class - A measure of the relative productive capacity of an area for timber or other vegetation.

Slash - The branches, bark, tops, cull logs,and broken or uprooted trees left on the ground after logging has been completed.

Snag - A standing dead tree from which the leaves and most of the branches have fallen.

Soil - The unconsolidated mineral and organic material on the immeditate surface of the earth that serves as a natural medium for the growth of land plants.

Soil Mapping Unit - A kind of soil, a combination of kinds of soils, or miscellaneous land type or types that can be shown at the scale of mapping for the defined purposes of the survey; the basis for the delineations of a soil survey map.

Standard Industrial Classification (SIC) - An industrial classification system as defined by the Office of Management and Budget; defines industries in accordance with the composition and structure of the economy and covers the entire field of economic activity. Refer to lumber and wood products for an explanation of SIC 24.

State Historic Preservation Office (SHPO) - Position established to review ESs within every state, maintain a register of historic sites (including archeological) for the State, and advise state land management agencies on archeological matters.

Subsurface Flow - Movement of water through the soil profile, often laterally.

Succession - The orderly process of community change. Process by which one plant community will succeed another over time given the same climatic conditions.

Suspended Sediment - Sediment suspended in a fluid by the upward components of turbulent currents or by colloidal suspension.

Sustained Yield - The yield that a forest can produce continuously at a given intensity of management.

Teratogenicity - Ability to cause abnormal development of a fetus.

Texture (soil) - The relative proportion of sand, silt and clay (expressed as percentages) in a soil; grouped into standard classes and subclasses in the USDA Soil Survey Manual.

Timber Activity Plan - A plan which deals specifically with the implementation of the approved allowable cut.

Timber Production Base - Acres included in the calculation of the allowable cut (see high intensity forest management lands).

Timber Production Capability Classification (TPCC) - A classification system that identifies the commercial forest and base capable of producing timber on a sustained yield basis.

True Fir - A member of the genus Abies, e.g., white fir (Abies concolor). Douglas-fir (Pseudotsuga menziesii) is not a true fir.

Understory Species - Shade-tolerant plant species which characteristically grow beneath the forest canopy; e.g., blackberry and rhododenron.

Unit Resource Analysis (URA) - A BLM planning document which contains a comprehensive inventory and analysis of the physical resources and an analysis of their potential for development, within a specified geographic area.

Visual Contrast - The effect of a striking difference in the form, line, color or texture of an area being viewed.

Visual Resource - The land, water, vegetation, animals and other features that are visible on all public lands.

Visual Resource Management (VRM) - Management of the visual landscape.

Visual Resource Management Classes - The degree of alteration that is acceptable within the characteristic landscape. Based upon the physical and sociological characteristics of any given homogeneous area.

Visual Zones - The area that can be seen from a location and classified as foreground, middleground, background or seldom seen.

Volatilize - To evaporate; to change from a liquid to a gas.

Water Quality - The combined physical, chemical and biological characteristics of water bodies.

Watershed - The area drained by a given stream.

Windthrow - The uprooting of a live tree by wind.

Xeric - A soil moisture regime resulting from a climate having moist cool winters and warm dry summers. Moisture is present in limited amounts but not at the optimum period for plant growth.

Yarding - The initial haul to a loading point, i.e., transporting timber from the stump to a landing.

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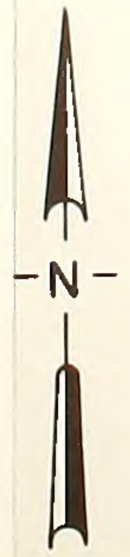
LEGEND
O & C Land
Public Domain Land
High Intensity Management Land
Low Intensity Management Land
Limited Management Land
Non-Commercial Forest &
Non-Forest Land
U S Forest Service Land
State Land
Interstate Highway
U S Highway
State Highway
All Weather Road
Seasonal Road
U S Forest Service Road
Pacific Crest Trail
SYU Boundary
O & C Lands Administered
By U S Forest Service
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
JACKSON & KLAMATH SUSTAINED YIELD UNITS
MEDFORD DISTRICT
1979
1 0 1 2 3 4 5 6 7
SCALE IN MILES
FIGURE 1-1
N

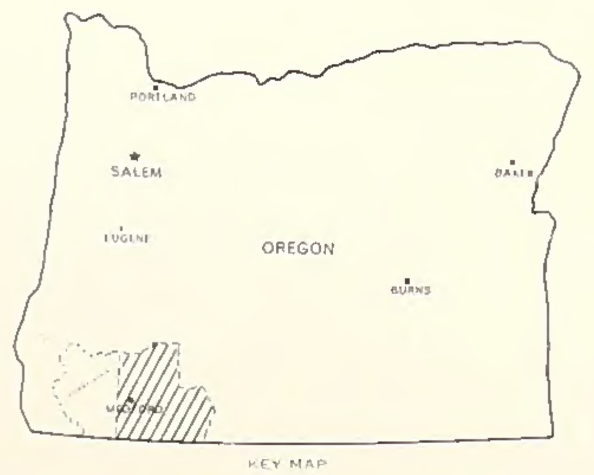
T35S
T36S
T37S
T38S
T39S
T40S
T41S
R5W
R4W
R3W
R2W
R1E
R2E
R3E
R4E
R5E
R6E
R7 1/2 E
R7E
R8E
GRANTS PASS
ROGUE
ROGUE RIVER
GOLD HILL
UPPER TABLE ROCK
LOWER TABLE ROCK
LONG MT.
LYMAN MT.
EAGLE POINT
WHITE CITY
CENTRAL POINT
JOHNS PK.
ROXY ANN PK.
MEDFORD
JACKSONVILLE
TIMBER MT.
MT. ISABELLE
APPLEGATE
PHOENIX
TALENT
RUCH
WOODRAT MT.
NEGRO BEN MT.
ANDERSON BUTTE
ASHLAND
MT. ASHLAND
APPLEGATE LAKE
AGATE RES.
EMIGRANT RES.
HOWARD PRAIRIE RES.
HYATT RES.
LITTLE HYATT RES.
CHINQUAPIN MT.
SODA MT.
PILOT ROCK
GRIZZLY MT.
MT. VIEW
PARKER MT.
HAYDEN MT.
CHASE MT.
HAMAKER MT.
BUCK MT.
SURVEYOR MT.
MT. McLOUGHLIN
FOURMILE LAKE
WILLOW CREEK RES.
FISH LAKE
LAKE O' WOODS
UPPER KLAMATH LAKE
ASPEN LAKE
ROUND LAKE
OATMAN LAKE
LONG LAKE VALLEY
KENO
KLAMATH RIVER
LAKE MILLER
JACKSON CO.
KLAMATH CO.
OREGON
CALIFORNIA
BEAR CREEK
LITTLE BUTTE CREEK
NORTH FORK
SOUTH FORK
APPLEGATE RIVER
LITTLE APPLEGATE RIVER
EMIGRANT CREEK
JENNY CR.
SPENCER
5
99
238
140
66
97

R. 5 W.
R. 4 W.
R. 3 W.
R. 2 W.
R. 1 W.
R. 1 E.
R. 2 E.
R. 3 E.
R. 4 E.
R. 5 E.
R. 6 E.
R. 7½ E.
R. 7 E.
R. 8 E.
T. 31 S.
T. 32 S.
T. 33 S.
T. 34 S.
T. 35 S.
T. 36 S.
T. 37 S.
122°30'
123°00'
122°00'
42°30'
DIAMOND LAKE 28 MI.
Union Creek
DOUGLAS CO.
JACKSON CO.
Prospect
ROGUE RIVER
McLeod
Shady Cove
Eagle Point
White City
Medford
Jacksonville
Central Point
Gold Hill
Rock Point
Sams Valley
Table Rock
Lakecreek
Butte Falls
Brownsboro
Starvation Heights
Robinson Butte
Mt. McLoughlin
MOUNTAIN LAKES
WILD AREA
UPPER KLAMATH LAKE

Compiled from Recent U. S. Geological Survey Quadrangles and Bureau of Land Management Planimetric Base Maps

See Appendix B-1, 2, 3 and Appendix C-1





U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

JACKSON & KLAMATH SUSTAINED YIELD UNITS

Scale ½" = 1 Mile

LOCATION OF TIMBER SALES AND HERBICIDE APPLICATION

1979

Figure A-1

LEGEND

Federal O & C Lands – BLM
Public Domain Lands – BLM
O & C Administered by U S Forest Service
National Forest Lands – USFS
U S Interstate Highway
U S Highway
State Highway
Major Routes of Public Use
All Weather Road
Seasonal Road (Dirt)
Pacific Crest Trail
Railroad
SYU Boundary
County Boundary
Triangulation Station
Lookout Station
Recreation Area – BLM
Recreation Area – Other
Mine or Quarry
Mill
Shelter
Building
Church
School
Timber Sale by Year
Herbicide Treatment Areas by Type of Treatment

U.S. GPO 1979

1 DESCRIPTION OF PROPOSED ACTION

2 DESCRIPTION OF THE ENVIRONMENT

3 IMPACTS OF THE PROPOSED ACTION

4 MITIGATING MEASURES NOT INCLUDED IN THE PROPOSED ACTION

5 ADVERSE IMPACTS WHICH CANNOT BE AVOIDED

6 THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND LONG-TERM ENHANCEMENT OF PRODUCTIVITY

7 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

8 ALTERNATIVES

9 CONSULTATION AND COORDINATION

pp. APPENDICES

G GLOSSARY

R REFERENCES CITED